APPENDIX B

TABLE 1
WASTESTREAM ANALYSIS

Table 1
Wastestream Analysis
68th Street Dump
December 4, 2002

COMPANY	WASTES GENERATED	HAZARDOUS SUBSTANCES	SOURCE*	REFERENCE
Allied Chemical (Block and Wills Street and 2000 Race Street)	salt wastes, filter cake, cyanide acid, copper-laden spent solution, industrial trash, collection sump sludge	trivalent chromium, potassium bichromate, copper, kepone, arsenic, chromium	1, 2, 5	Ref. 10, pp. 14, 48, 49, 50, 57, 76, 79, 80, 81, 90, 91, 92, 109, 131, 132, 134, 135, 138, 138a, 161, 164, 165, 166, 168, 169, 170, 173, 174, 175, 177, 178, 179, 181 Ref. 84, pp. 81 through 90
Western Electric (Lucent Technologies)	Waste oil, paint thinner, sludge copper mud water, varnolene (hazardous due to ignitability), plating waste, phenolic slurry, copper fluoborate, trichloroethene	fluoboric acid, cyanide acid, trichloroethene	1, 2, 5	Ref. 10, pp. 15, 39, 113, 116, 118a, 118b, 134, 135, 138, 138a, 142, 143, 162, 169, 170, 172, 173, 174, 175 Ref. 84, pp. 38 and 71 through 79
The O'Brien Corporation	paint waste	paint waste	1, 5	Ref. 10, pp. 27, 140, 142, 143 Ref. 83, pp. 17, 18 Ref. 84, pp. 1 through 4
General Motors	55-gallon drums of industrial wastewater treatment sludge, incinerator ash, paint sludge, solvents, waste oils, styrofoam	antimony, barium, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc	1, 2, 3, 4, 5	Ref. 10, pp. 4, 15, 16, 17, 25, 38, 49, 50, 80, 84, 113, 115, 118a, 118b, 140, 141, 143, 162, 164, 165, 166, 169, 170, 172, 173, 174, 175 Ref. 83, pp. 10, 16, 17, 20, 21, 23, 29, 85, 86 Ref. 84, pp. 10 through 18
Noxell Corporation	outdated products such as face and shaving creams, manufacturing wastes	flammable liquid, corrosive liquid, sodium hydroxide, 1,1,1-trichloroethane, acetone, hazardous waste liquid, waste enamel	1, 2, 5	Ref. 10, pp. 15, 16, 71, 116, 118a, 157, 160, 163, 164, 165, 166 Ref. 84, pp. 19 through 25

Table 1 (Continued)
Waste Stream Analysis
68th Street Dump
December 4, 2002

COMPANY	WASTES GENERATED	HAZARDOUS SUBSTANCES	SOURCE*	REFERENCE
GAF Materials	Old tar paper, roofing shingles	polyaromatic hydrocarbons	1,2,4,5	Ref. 10, pp. 14 and 159, 163, 164, 165, 166 Ref. 60, p. 9 Ref. 82, pp. 13 and 14 Ref. 84, pp. 26 through 29
Baltimore Gas and Electric	Bottom ash, fly ash, waste oil, slag	arsenic, cadmium, hexavalent chromium, lead, mercury, selenium, silver, copper, ammonia nitrate	1, 2, 4, 5	Ref. 10, pp. 7, 14, 17, 25, 27, 32, 33, 42, 44, 49, 58, 94, 96, 113, 114, 118a, 118b, 126, 130, 132, 145, 146, 149, 156, 161, 162, 164, 165, 166 Ref. 84, pp. 30 through 39
Crown, Cork, & Seal	lubricating fluid, waste oil, cork dust, lacquered-paper	phenol, diethanolamine, xylol, ketone, isophorone, methyl ethyl ketone, nitric acid, chromic acid, methyl isobutyl ketone, sulphuric acid, chromate pigments, phosphoric acid	1, 2, 5	Ref. 10, pp. 14, 26, 38, 80, 83, 103, 104, 105, 126, 140,141, 143, 145, 146, 149, 156, 163, 164, 165, 166, 169, 170, 172, 173, 174, 175 Ref. 84, pp. 40 through 51
Lasting Product Company	10 55-gallon drums of paint type products	paint waste	1	Ref. 10, pp. 5, 140, 141, 142, 143
Exxon (Standard Oil)	waste oil, tank cleaning wastes, leaded tank bottoms, solid asphalt wastes	lead, zinc, barium, cadmium, chromium	tank cleaning waste disposed of into pit on Source 5	Ref. 10, p. 27 Ref. 83, pp. 14 and 47 Ref. 84, pp. 52 through 58
Armco	slag, flue dust, refractory dust, copper molds, waste oil, hydraulic oil, waste grease, wastewater, sludge, lead dross, spent coating solutions, plating tank sludge, cleansing tank sludge, spent cleaning solvents, spent molyddenum coating spent coating solutions	iron oxides, nickel, manganese, chromium, iron, carbon, silicone, tin, zinc, copper, lead	1, 2, 5	Ref. 10, pp. 66, 113, 114, 118a, 118b, 145, 146, 149 Ref. 84, pp. 59 through 70

Table 1 (Continued)
Waste Stream Analysis
68th Street Dump
December 4, 2002

COMPANY	WASTES GENERATED	HAZARDOUS SUBSTANCES	SOURCE*	REFERENCE
Signode Steel	waste paint	lead	2, 5	Ref. 10, pp. 80, 88, 113, 116, 118a, 118b Ref. 83, pp. 17 and 19 Ref. 84, pp. 91 through 93
Bruning Paint Company (Chevron Corp.)	empty raw material drums, still bottoms, empty pigment bags, damaged paint cans	paint residue	1, 2, 5	Ref. 10, pp. 16, 25, 38, 113, 114, 118a, 118b, 141, 143, 162, 164, 165, 166 Ref. 83, p. 19 Ref. 84, pp. 94 through 96
SCM (Glidden Durkee, Co.)	sludge, and wastes generated by the manufacture of frit and inorganic oxides	lead, cadmium, chromium, hexavalent chromium, copper, nickel, zinc, barium, carbonate, cryolite-asbestos, lead oxide, potassium nitrate, and sodium nitrate	1, 2, 5	Ref. 10, pp.80, 84, 113, 115, 118a, 118b, 145, 147, 149, 169, 170, 172, 173, 174, 175 Ref. 84, pp. 97 through 101
Koppers	oils, solvents, coolant, sludges, acrylate and latex emulsions, resins, esters, waste paints and pigments	manganese, zinc, cadmium, copper, chromium, trichloroethyelene, PCBs	1, 2, 4, 5	Ref. 10, pp. 85, 115, 118a, 119, 120, 122a, 169, 170, 172, 173, 174, 175 Ref. 84, pp. 102 through 111
The Baltimore Sun	printing process waste, photographic developing chemicals	solvents, lead, ink	1, 2, 5	Ref. 10, pp. 80, 89, 169, 170, 171, 173, 174, 175, 177, 178, 179, 181 Ref. 84, pp. 112, 113
The Maryland Cup	ink, liquid latex waste, liquid glue waste, liquid solid waste, varnalene	1,1,1-trichloroethane, ink	Cannot be determined with existing information	Ref. 10, pp. 90, 91, 110 Ref. 84, pp. 114 through 117

* As discussed in the 68th Street Documentation Record, available information indicates that wastes were dumped concurrently at all five sources; however in some cases the referenced documents can be used to determine waste disposal at specific sources. In these cases, a source number has been assigned in the source column of Table 1.

APPENDIX C

SOURCE 1 SCORING

SOURCE 1 SCORESHEETS
COLGATE PAY DUMP/ORIGINAL LANDFILL

WORKSHEET FOR COMPUTING HRS SITE SCORE
68th STREET DUMP
SOURCE 1

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	NS	
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	100	10,000
2b.	Ground Water to Surface-water Migration Component (from Table 4-25, line 28)	NS	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	100	10,000
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	NS	
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	NS	
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10,000
6.	**HRS Site Score** Divide the value on line 5 by four and take the square root		50.00

NS = Not scored

TABLE 4-1

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
68th STREET DUMP
SOURCE 1

Factor Categories and Factors		Maximum Value	Value Assigned
Drinking Water Threat			
	Likelihood of Release		
1.	Observed Release	550	550
2.	Potential to Release by Overland Flow		
	2a. Containment	10	---
	2b. Runoff	25	---
	2c. Distance to Surface Water	25	---
	2d. Potential to Release by Overland Flow [lines 2a x (2b +2c)] 500	---	
3.	Potential to Release by Flood		
	3a. Containment (Flood)	10	---
	3b. Flood Frequency	50	---
	3c. Potential to Release by Flood [lines 3a x 3b]	500	---
4.	Potential to Release [lines 2d + 3c, subject to a maximum of 500]	500	---
5.	Likelihood of Release [higher of lines 1 and 4]	550	550
	Waste Characteristics		
6.	Toxicity/Persistence	a	10,000
7.	Hazardous Waste Quantity	a	100
8.	Waste Characteristics	100	32
	Targets		
9.	Nearest Intake	50	0
10.	Population		
	10a. Level I Concentrations	b	0
	10b. Level II Concentrations	b	0
	10c. Potential Contamination	b	0
	10d. Population [lines 10a + 10b + 10c]	b	0
11.	Resources	5	0
12.	Targets [lines 9 + 10d + 11]	b	0
	Drinking Water Threat Score		
13.	Drinking Water Threat Score [(lines 5 x 8 x 12)/82,500, subject to a maximum of 100]	100	0

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT
SCORESHEET (Continued)
68th STREET DUMP
SOURCE 1

Factor Categories and Factors Assigned		Maximum Value	Value Assigned
Human Food Chain Threat			
	Likelihood of Release		
14.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
15.	Toxicity/Persistence/Bioaccumulation	a	5×10^8
16.	Hazardous Waste Quantity	a	100
17.	Waste Characteristics	1,000	1,000
	Targets		
18.	Food Chain Individual	50	45
19.	Population		
	19a. Level I Concentrations	b	0
	19b. Level II Concentrations	b	0.03
	19c. Potential Human Food Chain Contamination	b	–
	19d. Population [lines 19a + 19b + 19c]	b	0.03
20.	Targets [lines 18 + 19d]	b	45.03
	Human Food Chain Threat Score		
21.	Human Food Chain Threat Score [(lines 14 x 17 x 20)/82,500, subject to a maximum of 100]	100	100

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT
SCORESHEET (Continued)
68TH STREET DUMP
SOURCE 1

Factor Categories and Factors Assigned		Maximum Value	Value Assigned
Environmental Threat			
	Likelihood of Release		
22.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
23.	Ecosystem Toxicity/Persistence/Bioaccumulation	a	5×10^8
24.	Hazardous Waste Quantity	a	100
25.	Waste Characteristics	1,000	320
	Targets		
26.	Sensitive Environments		
	26a. Level I Concentrations	b	0
	26b. Level II Concentrations	b	75
	26c. Potential Contamination	b	0.0065
	26d. Sensitive Environments [lines 26a + 26b + 26c]	b	
27.	Targets [value from line 26d]	b	75.01
	Environmental Threat Score		
28.	Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a maximum of 60]	60	60
	Surface Water Overland/Flood Migration Component Score for a Watershed		
29.	Watershed Score[c] [lines 13 + 21 + 28, subject to a maximum of 100]	100	100
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE			
30.	Component Score (S_{of})[c] [highest score from line 29 for all watersheds evaluated, subject to a maximum of 100]	100	100

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

4.0 SURFACE-WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 DEFINITION OF THE HAZARDOUS SUBSTANCE MIGRATION PATH FOR OVERLAND/FLOOD COMPONENT - SOURCE 1

Prior to landfilling, this source was predominately covered with PSS/FO and PEM wetlands located adjacent to Herring Run and Moore's Run. The only area not historically designated as wetlands was located in the northern portion of the source (Ref. 81, Figure 3). The historical aerial photography study completed for the site documents that the wetlands located adjacent to Moore's Run and Herring Run were landfilled with wastes; therefore, the PPE into surface waters of the hazardous substances documented in these wastes is in these wetlands (Ref. 81, Figures 3 and 7). The wetlands located in the north-eastern portion of Source 1 would eventually have discharged into Moore's Run, the wetlands located in the southern portion of Source 1 would eventually discharge into Herring Run. The in-water segment of the surface water pathway TDL was determined from the farthest upstream and downstream points where the wetlands and non-wetland areas of Source 1 would discharge into Herring Run (PPE_{1A} and PPE_{1B}) and Moore's Run (PPE_{1C} and PPE_{1D}). From PPE_{1A}, Herring Run flows in a southeasterly direction for approximately 1.5 miles until it discharges into the Back River. From the farthest upstream PPE in Moore's Run (PPE_{1C}), the in-water segment continues in Moore's Run in a southeasterly direction for approximately 0.53 mile until it discharges into Herring Run. From this point, Herring Run flows in a southeasterly direction for approximately 0.71 mile until it becomes the Back River. The Back River flows in an easterly direction for about 8.5 miles until it discharges into the Chesapeake Bay. The 15-mile surface water pathway target distance limit (TDL) ends in the Chesapeake Bay (as measured along the in-water segment from PPE_{1A} to 15 miles downstream of PPE_{1D}) (see Figures 4 and 6 in Appendix A).

Available data indicates that all of the surface water bodies located along the 15-mile TDL are tidally influenced (Ref. 16; Ref. 17; Ref. 18; Ref. 62; Ref. 82, Logbook 2, pp. 7, 26, 28, 35, and 38). Data does not exist to document the potential tidal carry of hazardous substances in the area of the site; however, during the April 6 through May 3, 2000 ESI, the sampling team observed and documented the tidal effect on Herring Run (Ref. 82, Logbook 2, pp. 7, 26, 28, 35, and 38). The uppermost reach of the tidal effect was observed to extend to the second overpass of the Interstate 95 highway (Ref. 81, Ref. 82, Logbook 2, p. 7).

4.1.2.1 LIKELIHOOD OF RELEASE - SOURCE 1

4.1.2.1.1 Observed Release - Source 1

Direct Observation- Source 1

- Basis for Direct Observation - Source 1

Source 1 was occupied by landfills operated by Robb Tyler and Henry Siejack during the 1950s and the 1960s. In September 1956, Henry Siejack was issued a permit to operate a landfill on 24 acres in Baltimore County. No permit was received to dispose of wastes on the portion of Siejack's property located along the City of Baltimore-Baltimore County line; however, aerial photographs and MD DHMH inspection reports document that wastes were deposited into the wetlands that once occupied this portion of the property as well (Ref. 6, pp. 6 through 15; Ref. 25; Ref. 55; Ref. 81). On September 16, 1953, Robb Tyler was issued a permit by the Baltimore County Health Department to operate a sanitary landfill on the property that he owned in the center of Source 1 (Ref. 8, pp. 1, 18 and 26).

Historical aerial photographs document that prior to use as a dump, PSS/FO and PEM wetlands covered a large portion of Source 1, between Moore's Run and Herring Run (Ref. 6, pp. 7 and 9; Ref. 81, Figure 3). The dumping of materials at Source 1 diverted the flow of Herring Run south of its original path (Ref. 6, pp. 10 and 11; Ref. 81). This indicates that materials deposited at Source 1 were in direct contact with adjacent surface waters. The documentation that wastes were deposited directly into surface waters is further documented in MD DHMH inspection reports prepared in 1955. Specifically, an inspection report dated January 7, 1955 documents that wastes were being deposited along a tributary of Herring Run, causing this tributary to dam up. The report further notes that "heavy pollution" in the form of an oil slick was observed entering this tributary (Ref. 8, p. 29). The inspectors also noted an "exceedingly large amount of barrels" strewn haphazardly on the landfill surface and a pit (measuring approximately 30 by 50 feet), that was being used for disposal of waste oil (Ref. 8, p. 29). An April 1955 inspection report documents that oil seepage from the pit was observed on the ground (Ref. 8, p. 32). Oil placed in this pit and another pit was deposited directly above "natural earth" (Ref. 8, p. 33).

Interviews conducted of former employees and waste haulers associated with the 68th Street Dump further document that the hazardous wastes disposed of at Source 1 were deposited directly into surface waters and wetlands. A former foreman at the 68th Street Dump site identified the area of Source 1 as the disposal area used by Robb Tyler in the 1950s and 1960s. He further stated that "waste materials disposed of at the 68th Street Dump site were dumped in swamp areas, and then covered up" (Ref. 10, pp. 161 and 166). A trash truck driver stated that Henry Siejack also dumped into the wetlands of Source 1.indicated that "waste materials disposed of at the 68th Street Dump site were dumped in swamp areas, and then were covered up" (Ref. 10, p. 161). This former trash truck driver further stated that Siejack would dig holes in the ground near the water. The water level and tide would then come in and cover up the holes full of waste. According to his interview, Siejack would do this to avoid detection of his waste disposal activities (Ref. 10, pp. 167 and 169).

The filling of wetlands with wastes is also documented by the historical aerial photographs taken of the site. A review of these aerial photographs document the filling of a total of 23.1 acres of PSS/FO and PEM wetlands at Source 1 (Ref. 81, pp. 15 and Figures 3 through 7).

In addition, indications that hazardous substances in materials deposited at Source 1 were in direct contact with surface waters is supported by the fact that Source 1 is located within the 100-year flood plain (Ref. 86). Baltimore County is nationally identified as an area that suffers severe losses due to floods (Ref. 88, p. 3). Major floods have occurred in Baltimore County in October 1954, August 1955, August 1971, June 1972 and September 1975 (Ref. 64, p. 7; Ref. 87, p. 4). One of the most damaging floods recorded in the Baltimore area occurred on August 1 through 2, 1971. The flood waters recorded in the Back River basin were equivalent to, or in excess of, the 100-year flood interval (Ref. 87, p. 7). A second major flood occurred in Baltimore during Hurricane Agnes, from June 21 through 23, 1972. Flood peaks greater than 100-year intervals were recorded in Baltimore at this time (Ref. 87, p. 7). Because the entire area of Source 1 is located within the 100-year flood zone, the waste that contained hazardous substances, which documentation indicates was disposed of at Source 1 during the 1950s and 1960s, was in direct contact with these flood waters. The National Climatic Data Center (NCDC) has documented several, more recent storm events (June 1996, September 1999, and July 14, 2000) that have caused flash flooding in the area where the 68th Street Dump site is located (Ref. 63). In 1996, Hurricane Fran produced stream flows in Maryland among the highest ever seen and in 1999 heavy downpours (4.77 inches fell in the space of a few hours) led to major flooding in the Baltimore area (Ref. 89, p.1; Ref. 90, p. 1). Analytical results from the samples collected from Source 1 in 1985, 1993 and in April 2000 document that hazardous substances were present at Source 1 during these flash flood events. Additional evidence that the area of the 68th Street Dump is prone to flash floods is provided by observations of the banks of Herring Run and Moore's Run. The banks of these streams adjacent to the 68th Street Dump site show evidence of the increase in flow due to storm events (Ref. 15, p. 5; Ref. 18; Ref. 68; Ref. 69; Ref. 76). Exposed landfilled materials have been observed in Herring Run due to erosion of its bank (Ref. 69).

- Hazardous Substances in the Release - Source 1

Information gathered during EPA investigations provides documentation of hazardous waste deposition at the 68th Street Dump by Robb Tyler. From the early 1950s through the 1970s, wastes from various industries located in the Baltimore area were disposed of at the five sources that comprise the 68th Street Dump. Written testimonies from haulers and former employees of Robb Tyler indicate that all types of waste was accepted at the site (Ref. 10, pp. 4, 14, 17, 24, 38, 49, 50, 105, 155, 156, and 157). According to Robb Tyler, prior to the 1960s, there were no restrictions on the types of wastes that could be dumped at the landfill. Mr. Tyler further testified that drummed liquid wastes were disposed of at the 68th Street Dump site and stated that if "they could resell the drums brought in they would do so" (Ref. 84, p. 75). A former employee also testified that wastes in drums were dumped out so that Robb Tyler could sell the drums (Ref. 83, p. 23). These statements indicate that the wastes contained in the drums were disposed of directly into the wetlands that covered all five source areas, including Source 1, during the 1950s and 1960s (Ref. 81, Figures 4 and 5). Information is available for some of the generators of wastes disposed

of at the site. The generators, wastes streams, and hazardous substances documented in these waste streams have been summarized in Table 1 in Appendix B.

EPA interviews conducted of former Robb Tyler employees and waste haulers provides evidence that waste streams generated by the following industries were disposed of at Source 1: Baltimore Gas and Electric; Allied Chemical; Western Electric; Noxell Corporation; GAF Materials; Armco; Koppers; the O'Brien Company; General Motors; Crown, Cork, & Seal; Lasting Product Company; Bruning Paint Company; SCM (Glidden Durkee, Co.); and the Baltimore Sun. Hazardous substances associated with the waste streams generated by these industries include trivalent chromium, potassium bichromate; copper; kepone, arsenic, chromium, fluoboric acid, cyanide acid, trichloroethene, sodium hydroxide, acetone, waste enamel, PAHs, PCBs, iron oxides, manganese, silicone, tin, mercury, paint waste, antimony, barium, cadmium, iron, nickel, zinc, hexavalent chromium, selenium, silver, ammonia nitrate, phenol, diethanolamine, xylol, ketone, isophorone, methyl ethyl ketone, nitric acid, chromic acid, methyl isobutyl ketone, sulphuric acid, chromate pigments, phosphoric acid, barium, cryolite-asbestos, potassium nitrate, lead oxide, sodium nitrate, solvents, ink, and 1,1,1-trichloroethane (see Table 1 in Appendix B for references).

Although the majority of the wetlands documented to have at one time existed at Source 1 have subsequently been filled in, a few wetland areas remain. The location of these remaining wetlands were field verified by representatives of the U.S. Fish and Wildlife Service during the 2000 ESI sampling event (Ref. 82, Log book 2, pp. 2, 10, 16 through 19). The laboratory analytical results of samples collected from these wetlands document the presence of hazardous substances in Source 1 wetlands. The table below summarizes the samples collected during the 2000 ESI from these wetlands. These samples were analyzed under EPA's CLP (Ref. 7, p. 1). To identify metal concentrations exceeding background levels, the metal concentrations detected in these wetland samples were compared to the analytical results from a sediment sample collected from a wetland located outside the influence of the site. This sample was collected in a wetland area located along Herring Run, upstream of the 68th Street Dump site. The sample was collected by the EPA Region 3 START in February 2001 and was analyzed for the same parameters as the samples collected from Source 1 (TCL organics and TAL metals by an EPA CLP laboratory) (Ref. 65). All sampling locations are shown on Figure 2 in Appendix A.

Hazardous Substance	Evidence	Concentration* (µg/kg)	SQL (µg/kg)	Reference
Organics				
Fluoranthene	MRWT-SD01	830	598.9	7, p. 221; 79
	ORWT-SD04	630	460.1	7, p. 221; 79
	HRWT-SD03	1,700	956	7, p. 223; 79
Pyrene	MRWT-SD01	890	598.9	7, p. 221; 79
	ORWT-SD04	560	598.8	7, p. 221; 79
	HRWT-SD03	1,500	956	7, p. 223; 79

Hazardous Substance	Evidence	Concentration* (µg/kg)	SQL (µg/kg)	Reference
alpha-Chlordane	MRWT-SD01	36	3.15	7, p. 224; 79
	ORWT-SD03	12	2.58	7, p. 224; 79
	HRWT-SD02	34 J (3.4)	3.43	7, P. 225; 79
gamma-Chlordane	MRWT-SD01	33	3.15	7, p. 224; 79
	HRWT-SD02	38 J (3.8)	3.15	7, p. 224; 79
Aroclor-1260	ORWT-SD03	240	50	7, p. 224; 79
	ORWT-SD04	130 J (13)	46	7, p. 224; 79
	HRWT-SD01	130 J (13)	79.7	7, p. 224; 79

Hazardous Substance	Evidence	Concentration* (mg/kg)	Background Concentration (SED-01) (mg/kg)	SQL (mg/kg)	Reference
Metals					
Arsenic	ORWT-SD03	4.6 J (2.6)	ND	3.07	7, p. 83; 65, p. 5; 79
	ORWT-SD04	3.7 J (2.1)	ND	2.8	7, p. 83; 65, p. 5; 79
Chromium	ORWT-SD03	154	21.6	3.1	7, p. 83; 65, p. 5; 79
	ORWT-SD04	75.1	21.6	2.8	7, p. 83; 65, p. 5; 79
	ORWT-SD05	72.1	21.6	2.8	7, p. 83; 65, p. 5; 79
	HRWT-SD01	83.3	21.6	5.11	7, p. 83; 65, p. 5; 79
Copper	ORWT-SD03	111	28.5	7.7	7, p. 83; 65, p. 5; 79
	HRWT-SD01	102	28.5	12.8	7, p. 83; 65, p. 5; 79
Lead	MRWT-SD01	218	49.8	1.29	7, p. 83; 65, p. 5; 79
	ORWT-SD03	365	49.8	0.92	7, p. 83; 65, p. 5; 79
	ORWT-SD04	170	49.8	0.84	7, p. 83; 65, p. 5; 79
	ORWT-SD05	214	49.8	0.84	7, p. 83; 65, p. 5; 79
	HRWT-SD01	287	49.8	1.53	7, p. 83; 65, p. 5; 79
Mercury	ORWT-SD03	0.36	[0.12] K	0.3	7, p. 83; 65, p. 5; 79
	HRWT-SD01	0.29 B	[0.12] K	0.3	7, p. 83; 65, p. 5; 79
Nickel	ORWT-SD03	56.9	15.8	12.3	7, p. 83; 65, p. 5; 79
	HRWT-SD01	49.1	15.8	20.5	7, p. 83; 65, p. 5; 79
Zinc	MRWT-SD01	323	75.1	8.62	7, p. 83; 65, p. 5; 79
	ORWT-SD03	464	75.1	6.13	7, p. 83; 65, p. 5; 79
	HRWT-SD01	420	75.1	10.2	7, p. 83; 65, p. 5; 79
	HRWT-SD02	267	75.1	8.3	7, p. 83; 65, p. 5; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

ND Not detected above the SQL

SQL Sample quantitation limit; SQL calculations provided in reference 79

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

K Analyte present; reported value may be biased high

Further evidence that hazardous substances were deposited directly into the wetlands of Source 1 is provided by laboratory analytical results of samples collected during three sampling events. Samples were collected in 1985 by MD WMA, in 1993 by MDE, and in 2000 by the EPA Region 3 SATA team.

Analytical results for the samples are provided as evidence of hazardous substance deposition into wetlands because the samples were collected at Source 1 in locations documented by historical aerial photographs to have at one time been covered in wetland vegetation. These aerial photographs further document the disposal of wastes into these wetlands (Ref. 6, pp. 6 through 15; Ref. 81, pp. 15 and Figures 3 through 7). No waste has been removed from Source 1; therefore, the analytical results summarized in the tables below document the hazardous substances present in the waste that was directly deposited into wetlands and also were present during the flood events discussed in this section under, "Basis for Direct Observation".

MD WMA Sample Results - 1985

Samples of the contents of the drums observed at Source 1 in 1985 by MD WMA were collected and analyzed for EP toxicity metals (Ref. 8, pp. 3, 59, 95 through 105). Analytical results indicated the presence of hexavalent chromium and lead concentrations above EP toxic levels (Ref. 8, pp. 3, 59, 95, 97, 98, 103, 104, and 105). These results document that waste characterized as hazardous based on the toxicity characteristic were disposed of at Source 1. As shown in the tables below, lead and chromium have also been detected at elevated levels in samples collected from the wetlands that remain at Source 1.

MDE Sample Results - 1993

In 1993, the MDE collected samples from Source 1. These samples were collected in an area designated as wetlands at the time the samples were collected (Ref. 9, p. 47). The area where these samples were collected was in an area historically covered in PSS/FO and PEM wetlands (Ref. 81, pp. 5, 15 and Figure 3). These samples were analyzed in accordance with CLP protocols (Ref. 9, pp. 18, 20, and 47). Two samples, Soil-5 and Soil-6, were collected to establish background concentrations of metals (Ref. 9, pp. 20, 23, 24, and 27). These background concentrations have been used to determine the significance of the metals detected at Source 1. If the metal was detected in both background samples the sample with the higher concentration was used as the comparative sample. The table below presents the sample with the highest concentration of each hazardous substance detected at Source 1 (for a complete list of all contaminated samples see Section 2.2).

Hazardous Substance	Evidence	Concentration (µg/kg)	SQL (µg/kg)	Reference
Organics				
Benzo(a)anthracene	Soil-2	910	375	9, pp. 156 and 299; 79
Benzo(b)fluoranthene	Soil-2	1900	375	9, pp. 156 and 299; 79
Chlordane (alpha)	Soil-4	4.2	1.9	9, pp. 156 and 357; 79
Chlordane (gamma)	Soil-3	8.7	2.1	9, pp. 156 and 356; 79
4,4'-DDE	Soil-3	32	4.0	9, pp. 156 and 356; 79
Fluoranthene	Soil-2	2,000	375	9, pp. 156 and 299; 79
Phenanthrene	Soil-2	1,200	375	9, pp. 156 and 299; 79
Pyrene	Soil-2	740	375	9, pp. 156 and 299; 79

Hazardous Substance	Evidence	Concentration* (mg/kg)	Background Concentration (Soil-5 or Soil-6)* (mg/kg)	SQL (mg/kg)	Reference
Metals					
Aluminum	Soil-13	118,000	6,470	48.3	9, pp. 113, 231 and 232; 79
Arsenic	Soil-2	56.2 L	3.9 L (6.79)	2.3	9, pp. 113, 228, 231 and 232; 79
Barium	Soil-13	2,250	74.1	48.3	9, pp. 113, 229, 231 and 232; 79
Cadmium	Soil-3	101	ND	1.3	9, pp. 113, 229, 231 and 232; 79
Chromium	Soil-13	299 J (231.8)	29.3 J (37.8)	2.4	9, pp. 113, 229, 231 and 232; 79
Copper	Soil-2	5,270	25.8	5.7	9, pp. 113, 229, 231 and 232; 79
Lead	Soil-3	2,680	201 J (289)	0.8	9, pp. 113, 229, 231 and 232; 79
Manganese	Soil-3	2,060 J (1661)	240 J (297.6)	3.8	9, pp. 113, 229, 231 and 232; 79
Mercury	Soil-1	1.8	0.28	0.1	9, pp. 113, 229, 231 and 232; 79
Nickel	Soil-2	121	ND	9.1	9, pp. 113, 229, 231 and 232; 79
Selenium	Soil-3	10.4 L	ND	6.3	9, pp. 113, 229, 231 and 232; 79
Silver	Soil-3	12.6	ND	2.5	9, pp. 113, 229, 231 and 232; 79
Zinc	Soil-3	4,560	77.0	5.0	9, pp.113, 229, 231 and 232; 79

Notes:

*	All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.
mg/kg	Milligrams per kilogram
µg/kg	Micrograms per kilogram
ND	Not detected above the SQL
SQL	Sample quantitation limit; SQL calculations provided in reference 79

Analytical Data Qualifiers:

J	Analyte present; reported value may not be accurate or precise
L	Analyte present; reported value may be biased low
[ ]	Analyte present; as values approach the instrument detection limit the quantitation may not be accurate

EPA SATA Team Results - 2000

Further evidence that hazardous substances were deposited directly into the wetlands of Source 1 is provided by laboratory analytical results of samples collected in 2000 by the EPA Region 3 SATA team. Sampling locations are shown in Figure 2 in Appendix A. Analytical results for the samples are provided as evidence of hazardous substance deposition into wetlands because the samples were collected at Source 1 in locations documented by historical aerial photographs to have at one time been covered in

wetland vegetation. These aerial photographs further document the disposal of wastes into these wetlands (Ref. 6, pp. 6 through 15; Ref. 81). No waste has been removed from Source 1; therefore, the analytical results summarized in the table below document the hazardous substances present in the waste that was directly deposited into the wetlands of Source 1. To identify metal concentrations exceeding background levels, the metal concentrations detected at Source 1 were compared to the concentrations detected in soil sample CPBWSS-01A, which was collected outside the influence of the site (Ref. 7, p. 12). Only the analytical result for the sample with the highest concentration of each hazardous substance is provided in the table below, (for a complete list of all contaminated samples collected from Source 1, see Section 2.2, Source Characterization).

Hazardous Substance	Evidence	Concentration * (µg/kg)	SQL (µg/kg)	Reference
Organics				
2-Methylnaphthalene	ORLF-WS19B	190,000	11,579	7, p. 110; 79
	ORLF-WS26B	9,300	825	7, p. 114; 79
4-Chloroaniline	ORLF-WS26B	18,000	825	7, p. 114; 79
4-Niroaniline	ORLF-WS26B	32,000	2075	7, p. 115; 79
Acenaphthene	ORLF-WS20B	11,000	4,177	7, p. 112; 79
	ORLF-WS26B	20,000	825	7, p. 114; 79
Anthracene	ORLF-WS20B	9,300	4,177	7, p. 113; 79
	ORLF-WS26C	52,000	15,865	7, p. 115; 79
Benzo(a)anthracene	ORLF-WS26C	140,000 +	63,461	7, p. 115; 79
Benzo(b)fluoranthene	ORLF-WS01B	1,100	412.5	7, p. 107; 79
	ORLF-WS26C	150,000 +	63,461	7, p. 115; 79
Benzo(k)fluoranthene	ORLF-WS05B	1,100	795.2	7, p. 107; 79
	ORLF-WS26A	3,200	2,012	7, p. 115; 79
Benzo(g,h,i)perylene	ORLF-WS26C	33,000	15,865	7, p. 115; 79
Benzo(a)pyrene	ORLF-WS05B	1,100	795.2	7, p. 107; 79
	ORLF-WS26C	120,000	15,865	7, p. 115; 79
bis(2-Ethylhexyl)phthalate	CPLF-WS05B	49,000	10,061	7, p. 129; 79
	ORLF-WS19B	82,000	11,579	7, p. 111; 79
Butylbenzylphthalate	CPLF-WS08B	13,000	825	7, p. 131; 79
	ORLF-WS20B	7,900	4,177.2	7, p. 113; 79
Carbazole	ORLF-WS20B	4,700	4,177.2	7, p. 113; 79
	ORLF-WS26B	19,000	825	7, P. 115; 79

Hazardous Substance	Evidence	Concentration * (µg/kg)	SQL (µg/kg)	Reference
Chrysene	ORLF-WS01B	1,100	412.5	7, p. 107; 79
	ORLF-WS26C	120,000	15,865	7, p. 115; 79
4,4-DDD	ORLF-WS18B	150 +	41.25	7, p. 118; 79
4,4-DDT	ORLF-WS18B	360 J (28.1)	4.125	7, p. 118; 79
Dibenzofuran	ORLF-WS20B	9,000	4,177.2	7, p. 113; 79
	ORLF-WS26B	22,000	825	7, p. 115; 79
Dibenz(a,h)anthracene	ORLF-WS26C	20,000	15,865	7, p. 115; 79
Di-n-butylphthalate	CPLF-WS08B	3,400	825	7, p. 131; 79
Fluoranthene	ORLF-WS20B	17,000	4,177.2	7, p. 113; 79
	ORLF-WS26C	340,000	15,865	7, p. 115; 79
Fluorene	ORLF-WS20B	14,000	4,177.2	7, p. 113; 79
gamma-Chlordane	ORLF-WS20A	42 +	10.6	7, p. 118; 79
	ORLF-WS28B	170 + J (17)	36.2	7, p. 120; 79
Hexachlorocyclopentadiene	CPLF-WS08B	1,600 J (160)	825	7, p. 130; 79
Indeno(1,2,3-cd)pyrene	ORLF-WS20B	560 J (56)	4,177.2	7, p. 113; 79
	ORLF-WS26C	39,000	15,865	7, p. 115; 79
Naphthalene	CPLF-WS08B	2,700	825	7, p. 130; 79
	ORLF-WS18B	74,000	4,125	7, p. 110; 79
Phenanthrene	ORLF-WS20B	42,000 +	8,354	7, p. 113; 79
	ORLF-WS26C	160,000 +	63,461	7, p. 115; 79
Pyrene	ORLF-WS20B	13,000	4,177	7, p. 113; 79
	ORLF-WS26C	250,000 +	63,461	7, p. 115; 79
Aroclor-1232	ORLF-WS01B	3,300 + J (330)	412.5	7, p. 116; 79
	CPLF-WS05B	15,000 +J (1,500)	805	7, p. 132; 79
Aroclor-1242	CPLF-WS08D	3,300 +J (330)	209	7, p. 133; 79
Aroclor-1254	ORLF-WS01B	2,700 +	412.5	7, p. 116; 79
	CPLF-WS06B	500	80.5	7, p. 133; 79

Hazardous Substance	Evidence	Concentration (mg/kg)	Background Concentration* (CPBWSS-01A) (mg/kg)	SQL (mg/kg)	Reference
Metals					
Antimony	ORLF-WS08B	326 L	ND	16.3	7, pp. 12, 38, 87; 79
	ORLF-WS25B	419 L	ND	16.0	7, pp. 12, 41, 87; 79
Arsenic	ORLF-WS09B	35.9 L	4.3 L (7.48)	2.6	7, pp. 12, 38, 87; 79
Barium	ORLF-WS07B	1,500	118	60.8	7, pp. 12, 37, 87; 79
Cadmium	ORLF-WS09B	8.4	ND	1.3	7, pp. 12, 38, 87; 79
	ORLF-WS20A	5.7	ND	1.3	7, pp. 12, 40, 87; 79
Chromium	CPLF-WS08D	483 L	27	2.5	7, pp. 12, 46, 87; 79
	ORLF-WS20A	359	27	2.5	7, pp. 12, 40, 87; 79
Copper	CPLF-WS04B	249	33.7	5.8	7, pp. 12, 45, 87; 79
	ORLF-WS20A	349	33.7	6.3	7, pp. 12, 40, 87; 79
Lead	ORLF-WS19B	2,760	101	1.1	7, pp. 12, 39, 87; 79
	ORLF-WS27B	3,730	101	0.8	7, pp. 12, 41, 87; 79
Manganese	ORLF-WS09B	4,350 L	487	3.9	7, pp. 12, 38, 87; 79
	ORLF-WS18B	6,050	487	4.0	7, pp. 12, 39, 87; 79
Mercury	ORLF-WS20A	2.6	0.18	0.1	7, pp. 12, 40, 87; 79
	ORLF-WS25B	1.6	0.18	0.1	7, pp. 12, 41, 87; 79
Nickel	CPLF-WS08C	615	16.3	10.5	7, pp. 12, 46, 87; 79
	ORLF-WS20B	211	16.3	10.1	7, pp. 12, 40, 87; 79
Silver	ORLF-WS10C	22.0	ND	2.8	7, pp. 12, 38, 87; 79
	ORLF-WS28B	8.6	ND	4.9	7, pp. 12, 41, 87; 79
Zinc	ORLF-WS04B	2,690 L	142	5.5	7, pp. 12, 37, 87; 79
	ORLF-WS07B	2,050 L	142	6.1	7, pp. 12, 37, 87; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

ND Not detected above SQL

SQL Sample quantitation limit; SQL calculations provided in reference 79

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

L Analyte present; reported value may be biased low

\+ Results reported from diluted sample

Chemical Analysis - Source 1

- MDE ESI Sample Results - 1993

An observed release of hazardous substances from Source 1 into Herring Run can be documented based on chemical analysis of samples collected in 1993 during the MDE ESI (Ref. 9, pp. 18, 20, and 47). All samples collected during the ESI were analyzed for TCL organic and TAL inorganic compounds in accordance with EPA CLP protocols (Ref. 9, p. 18). Samples collected directly downstream of Source 1 have been compared to samples collected upstream of all of the other sources identified at the 68th Street Dump site.

- Background Samples

Sample ID	Sample Location	Depth (inches)	Date	Reference
SED-8	Moore's Run	Unknown	6/3/93	9, pp. 19, 162, 170 and 171
SED-11	Herring Run	Unknown	6/2/93 - 6/3/93	9, pp. 20, 153, 170 and 171

- Background Concentrations

Sample ID	Hazardous Substance	Sample Concentration (µg/kg)	SQL (µg/kg)	Reference
SED-8	Benzo(b)fluoranthene	ND	371	9,pp. 162, 323; 79
	Fluoranthene	ND	371	9, pp. 162, 323; 79
SED-11	Benzo(b)fluoranthene	ND	440	9, pp. 153, 291; 79
	Fluoranthene	ND	440	9, pp. 153, 291; 79
	Phenanthrene	ND	440	9, pp. 153, 291; 79

Notes:

µg/kg Micrograms per kilogram
ND Not detected above the SQL
SQL Sample quantitation limit, SQL calculations provided in reference 79

- Release Samples

Sample ID	Sample Location	Depth (inches)	Date	Reference
SED-7	Moore's Run	Unknown	6/2/93 - 6/3/93	9, pp. 19, 153, 170, 171
SED-9	Herring Run	Unknown	6/2/93 - 6/3/93	9, pp. 19, 153, 170, 171

- Release Concentrations

Sample ID	Hazardous Substance	Sample Concentration (µg/kg)	SQL (µg/kg)	Reference
SED-7	Benzo(b)fluoranthene	740	452	9,pp. 153, 283; 79
	Fluoranthene	750	452	9, pp. 153, 283; 79
SED-9	Benzo(b)fluoranthene	600	465	9, pp. 153, 285; 79
	Fluoranthene	880	465	9, pp. 153, 285; 79
	Phenanthrene	500	465	9, pp. 153, 285; 79

Notes:
µg/kg Micrograms per kilogram
SQL Sample quantitation limit, calculations provided in reference 79

An observed release from Source 1 into Herring Run and Moore's Run can also be documented based on chemical analysis of samples collected during the ESI completed by the EPA Region 3 SATA team in 2000. For Herring Run, analytical results for downstream sampling locations were compared to the analytical results for a sample collected upstream of Source 1 (HR-SD03). Another upstream sample, HR-SD02, was collected during the ESI above where five or six stormwater outfalls discharge into Herring Run. The sample, HR-SD03 was collected downstream of where these outfalls discharged (Ref. 82, Logbook 2, p. 7). The sample HR-SD02, was determined to not be a suitable background sample because of difficulties encountered by the laboratory during the analysis of this sample. The sample had to be diluted prior to analysis, resulting in a very high sample quantitation limit (SQL) (Ref. 91). The estimated concentrations and number of hazardous substances reported in HR-SD02 was less than the concentrations and number of hazardous substances reported in HR-SD03; therefore, using HR-SD03 as the background sample presents the most conservative approach to scoring the surface water pathway (Ref. 7, p. 178).

The ESI sampling team conducted sampling activities at the site from April 6 through May 3, 2000, during this time period tidal effect was observed on Herring Run (Ref. 82, Logbook 2, pp. 7, 26, 28, 35, and 38). The uppermost reach of the tidal effect was observed at the second overpass of the Interstate 95 highway (Ref. 18; Ref. 82, Logbook 2, p. 7). The background sample HR-SD03 was collected above the point of the observed upstream extent of tidal effect in Herring Run (Figure 2, which can be found in Appendix A).

For Moore's Run, analytical results from the chosen surface water and sediment background sampling location (MR-SD/SW02) were compared to the analytical results for samples collected from two locations downstream of Source 1 (MR-SD/SW05 and MR-SD/SW06). A second upstream sediment sample (MR-SD01) was collected in Moore's Run during the ESI. This sample does not meet the criteria as an appropriate background sample because it was collected in an area where an oil sheen was observed and would therefore not accurately reflect the ambient background concentrations of hazardous substances in Moore's Run (Ref. 82, Logbook 2, pp. 5 and 6).

The background sediment samples (HR-SD03 and MR-SD02) were collected during the same sampling event, using the same protocols, and within the same urban environment as the release samples. The background aqueous sample was collected from the same surface water body on the same day as the release aqueous sample. There were no documented occurrences of rainfall events between the collection of the background aqueous and release aqueous samples (Ref. 82, Logbook 2, pp. 10 and 11). Environmental parameters including pH, conductivity, dissolved oxygen, temperature, and salinity readings were measured at both the background and release aqueous sampling locations and indicate that the background and release samples were located in similar environmental settings (Ref. 82, Logbook 2, pp.10 and 11). All sampling locations are shown in Figure 2 in Appendix A.

- Background Samples - Sediments

Sample ID	Sample Location	Depth (inches)	Date	Reference
HR-SD03	Herring Run	0-6	4/7/00	7, p. 19; 18; 82, Logbook 2, pp. 7 and 9
MR-SD02	Moore's Run	0-6	4/7/00	7, p. 21; 18; 82, Logbook 1, p. 5 and Logbook 2, pp. 6 and 9

-Background Samples - Aqueous

Sample ID	Sample Location	Date	Reference
MR-SW02	Moore's Run	4/10/00	7, p. 21; 82, Logbook 2, pp. 6 and 11

- Background Concentrations - Sediments

Sample ID	Hazardous Substance	Sample Concentration (µg/kg)	SQL (µg/kg)	Reference
Organics				
HR-SD03	Benzo(a)anthracene	ND	434.2	7, p. 178; 79
	Benzo(k)fluoranthene	ND	434.2	7, p. 178; 79
	Benzo(a)pyrene	ND	434.2	7, p. 178; 79
	Benzo(g,h,i)perylene	ND	434.2	7, p. 178; 79
MR-SD02	Aroclor-1260	ND	40.9	7, p. 201; 79
Metals		**(mg/kg)**	**SQL (mg/kg)**	
HR-SD03	Lead	38.6 B	0.89	7, p. 66; 79
MR-SD02	Lead	10.6 B	0.77	7, p. 74; 79
	Zinc	35.6 B	5.1	7, p. 74; 79

Notes:

µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
ND	Not detected above the SQL
SQL	Sample quantitation limit; calculations provided in reference 79

Analytical Data Qualifiers:

B	Not detected substantially above the level reported in laboratory or field blanks
J	Analyte present; reported value may not be accurate or precise

- Background Concentrations - Aqueous

Sample ID	Hazardous Substance	Sample Concentration (µg/L)	CRDL (µg/L)	Reference
MR-SW02	Chromium	ND	10	7, p. 75
	Lead	ND	3	7, p. 75
	Barium	ND	200	7, p. 75
	Manganese	201	15	7, p. 75
	Zinc	27.7 B	20	7, p. 75

Notes:

B	Not detected substantially above the level reported in laboratory or field blanks
CRDL	Contract-required detection limit
µg/L	Micrograms per liter
ND	Not detected above the CRDL

- Release Samples - Sediments

Sample ID	Sample Location	Depth (inches)	Date	Reference
HR-SD04	Herring Run	0-6	4/7/00	7, p. 19; 18; 82, Logbook 2, pp. 8 and 9
HRB-SD03	Herring Run	0-6	4/24/00	7, p. 20; 18; 82, Logbook 2, p. 22
HRB-SD04	Herring Run	0-6	4/24/00	7, p. 20; 18; 82, Logbook 2, p. 22
HRB-SD05	Herring Run	0-6	4/26/00	7, p. 20; 18; 82, Logbook 2, p. 28
MR-SD05	Moore's Run	0-6	4/10/00	7, p. 21; 18; 82, Logbook 2, p. 9
MR-SD06	Moore's Run	0-6	4/10/00	7, p. 21; 18; 82, Logbook 2, p. 10

- Release Samples - Aqueous

Sample ID	Sample Location	Date	Reference
MR-SW04	Moore's Run	4/10/00	7, p. 21; 82, Logbook 2, pp. 9 and 10
MR-SW06	Moore's Run	4/10/00	7, p. 21; 82, Logbook 2, p.10

- Release Concentrations - Sediments

Sample ID	Hazardous Substance	Sample Concentration* (µg/kg)	SQL (µg/kg)	Reference
Organics				
HRB-SD03	Benzo(a)anthracene	620	351	7, p. 182; 79
	Benzo(k)fluoranthene	630	351	7, p. 182; 79
	Benzo(a)pyrene	700	351	7, p. 182; 79
HRB-SD04	Benzo(a)anthracene	780	458	7, p. 182; 79
	Benzo(k)fluoranthene	760	458	7, p. 182; 79
	Benzo(a)pyrene	910	458	7, p. 182; 79
	Benzo(g,h,i)perylene	480	458	7, p. 182; 79
HRB-SD05	Benzo(a)anthracene	440	429	7, p. 182; 79
	Benzo(k)fluoranthene	440	429	7, p. 182; 79
	Benzo(a)pyrene	440	429	7, p. 182; 79
MR-SD06	Aroclor - 1260	96	44.6	7, p. 201; 79
Sample ID	**Hazardous Substance**	**Sample Concentration* (mg/kg)**	**SQL (mg/kg)**	**Reference**
Metals				
HR-SD04	Lead	117	0.79	7, p. 66; 79
MR-SD05	Lead	179 J (124)	0.98	7, p. 74; 79
	Zinc	201	6.5	7, p. 74; 79
MR-SD06	Lead	72.2 J (50)	0.92	7, p. 74; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

SQL Sample quantitation limit; SQL calculations provided in reference 79

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

- Release Concentrations - Aqueous

Sample ID	Hazardous Substance	Sample Concentration (µg/L)	CRDL (µg/L)	Reference
MR-SW04	Chromium	45.2	10	7, p. 75
	Lead	39.2	3	7, p. 75
	Zinc	126	20	7, p. 75
MR-SW06	Barium	294	200	7, p. 75
	Lead	20.5	3	7, p. 75
	Manganese	622	15	7, p. 75
	Zinc	90.6	20	7, p. 75

Notes:
CRDL Contract-required detection limit
µg/L Micrograms per liter

Attribution:

Source 1 was used as an open dump during the 1950s and 1960s. During this time the majority of Source 1, from Moore's Run to Herring Run, was covered in PSS/FO and PEM wetlands (Ref. 6, pp. 6 through 15; Ref. 8, pp. 1 and 18; Ref. 28; Ref. 25; Ref. 55; Ref. 81). As detailed in the discussions in the observed release section, waste containing hazardous substances was disposed of at Source 1. The dump was uncontained, and therefore hazardous substances in the waste material was able to migrate from the wetlands into Moore's Run and Herring Run. Documentation that this occurred is provided by the analytical results of samples collected from wetlands that remain at Source 1. In addition to the direct deposition of hazardous substances into wetlands located adjacent to Moore's Run and Herring Run, the hazardous substances documented at Source 1 would also have been in direct contact with surface waters during the numerous storm events and subsequent flooding documented to have occurred in this area (Ref. 15, p. 5; Ref. 18; Ref. 20; Ref. 63; Ref. 76; Ref. 86; Ref. 87). Finally, hazardous substances detected in the samples collected from Moore's Run and Herring Run downstream of Source 1 were also detected at elevated concentrations in samples collected from Source 1, documenting that a release, at least partially attributable to Source 1, to surface waters has occurred.

Other potential sources of hazardous substances located in the area of Source 1 include the stormwater outfalls observed discharging into Herring Run upstream of the source, and the effect of the tidal fluctuations noted in the area. As discussed in the observed release section, two upstream samples (HR-SD02 and HR-SD03), were collected from Herring Run during the 2000 ESI. To address the effect of the stormwater outfall discharges, the upstream sample with the highest concentration of hazardous substance detected was used to document as the background concentration. The potential tidal carry of hazardous substances that may be present downstream of Source 1 in Herring Run or the Back River cannot be satisfactorily established; however, the documentation that the hazardous substances detected in samples collected downstream of Source 1 were also detected at elevated concentrations in samples collected from Source 1 and from wetlands that remain at Source 1establishes that hazardous substances have migrated from Source 1 into adjacent wetlands and surface waters, and therefore Source 1 is at least partially attributable to the elevated concentrations of hazardous substances observed downstream of Source 1.

Hazardous Substances in the Release:

Aroclor-1260
Barium
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(a)pyrene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chromium
Fluoranthene
Lead
Manganese
Phenanthrene
Zinc

4.1.2.2 WASTE CHARACTERISTICS

4.1.2.2.1 Toxicity/Persistence

The toxicity/persistence values for Source 1 are presented in section 4.1.2.2 of the HRS Documentation Record for the site.

Highest Toxicity/Persistence Value = 10,000

4.1.2.2.2 Hazardous Waste Quantity

Source HWQ values assigned are summarized below.

Source No.	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (Yes/No)
1	Colgate Pay Dump/Original Landfill	69.8	No
	TOTAL	**69.8***	

*Level II targets have been documented downstream of this source; therefore, a HWQ factor value of 100 is assigned (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.2.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor value for the drinking water threat is calculated below, as specified in the HRS Final Rule (Ref. 1):

Toxicity/Persistence Factor Value = 10,000
HWQ Factor Value = 100
Toxicity/Persistence Factor Value (10,000) × HWQ Factor Value (100) = 1×10^6

Waste Characteristics Factor Category Value (Ref. 1, Table 2-7) = 32

4.1.2.3 DRINKING WATER TARGETS

There are no drinking water intakes located within the 15-mile TDL; therefore, the drinking water threat was not scored (Ref. 67).

4.1.3.2 Waste Characteristics

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

See Section 4.1.2.2 of the HRS Documentation Record for the toxicity/persistence factor values, the human food chain bioaccumulation values, and the combined toxicity/persistence/bioaccumulation factor values for all hazardous substances detected at Source 1.

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Toxicity/Persistence/Bioaccumulation Factor Value = $5x10^8$

4.1.3.2.2 Hazardous Waste Quantity

Source HWQ values assigned are summarized below.

Source No.	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (Yes/No)
1	Colgate Pay Dump/Original Landfill	69.8	No
	TOTAL	**69.8***	

* Level II targets have been documented downstream of this source; therefore, an HWQ factor value of 100 is assigned (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.3.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor value for the human food chain threat is calculated below, as specified in the HRS Final Rule (Ref. 1, Section 4.1.3.2.3):

Toxicity/Persistence Factor Value = 10,000
HWQ Factor Value = 100
Bioaccumulation Potential Factor Value (BPFV) = $5x10^{8}$

Toxicity/Persistence Factor Value (10,000) × HWQ Value (100) = 1×10^{6}
1×10^{6} × BPFV ($5x10^{8}$)= Waste Characteristics Product ($5x10^{14}$) (subject to maximum value at 1×10^{12})

Waste Characteristics Factor Category Value (Ref. 1, Table 2-7) = 1,000

Waste Characteristics Factor Category Value = 1,000

4.1.3.3 HUMAN FOOD CHAIN THREAT-TARGETS

Actual Human Food Chain Contamination

Sediment Samples - Herring Run

Herring Run has been established as a fishery along the entire 15-mile TDL (see Section 4.1.3.3 of the documentation record).

Sediment samples collected from Herring Run that contained hazardous substances having a bioaccumulation potential factor value of 500 or greater and that meet the criteria for an observed release are presented below. Hazardous substances detected in sediment samples collected downstream of all five sources were also detected at each individual source; therefore the release of these hazardous substances is partially attributable to each of the five sources at the 68th Street Dump. All of these samples are documented in the observed release section, Section 4.1.2.1.1 for the overall site. In addition sediment samples SED-9, HRB-SD03, HRB-SD04 and HRB-SD05 are located downstream of Source 1 and are provided to further document the actual contamination in the area of Herring Run downstream of Source 1. These samples are documented in the observed release Section 4.1.2.1 provided for Source 1 in this Appendix. The bioaccumulation potential factor values are documented in Section 4.1.3.2.1 of the documentation record of the entire site.

Sample ID	Downstream of Source No.	Hazardous Substance	Sample Concentration* (µg/kg)	Bioaccumulation Value
Organics				
SED-9	1	Benzo(b)fluoranthene	600	50,000
		Fluoranthene	880	5,000
HRB-SD03	1	Benzo(a)anthracene	620	50,000
		Benzo(k)fluoranthene	630	50,000
		Benzo(a)pyrene	700	50,000
HRB-SD04	1	Benzo(a)anthracene	780	50,000
		Benzo(k)fluoranthene	760	50,000
		Benzo(a)pyrene	910	50,000
HRB-SD05	1	Benzo(a)anthracene	440	50,000
		Benzo(k)fluoranthene	440	50,000
		Benzo(a)pyrene	440	50,000
BR-SD03	1,2,3,4,5	Benzo(a)anthracene	650	50,000
		Benzo(k)fluoranthene	620	50,000
		Benzo(a)pyrene	680	50,000

Sample ID		Hazardous Substance	Sample Concentration (mg/kg)	Bioaccumulation Value
Metals				
BR-SD04	1, 2, 3, 4, 5	Zinc	464 L	500
BR-SD06	1, 2, 3, 4, 5	Zinc	327	500

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

mg/kg Milligrams per kilogram

µg/kg Micrograms per kilogram

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

L Analyte present; reported value may be biased low

Closed Fisheries

No closed fisheries have been established within the 15-mile TDL.

Level I Concentrations

No Level I concentrations have been established.

Most Distant Level II Sample

Analysis of sediment sample BR-SD03 detected three hazardous substances (benzo(a)anthracene, benzo(k)fluoranthene, and benzo(a)pyrene) in Herring Run that were also detected in samples collected from Source 1.

Sample ID: BR-SD03
Distance from PPE_{1A}: 8,204 feet
Reference: Figures 2, 3, and 6 in Appendix A

Level II Fisheries

Hazardous substances that have bioaccumulation potential factor values of 500 or greater were detected in sediment samples collected from Herring Run. The extent of Level II fisheries that can be documented for the Source 1 site includes the distance from PPE_{1A} to sediment sampling location BR-SD03.

Identity of Fishery	Extent of the Level II Fishery
Herring Run	8,204 feet

4.1.3.3.1 Food Chain Individual

A food chain individual factor value of 45 is assigned for Source 1 because a portion of the Herring Run fishery is subject to Level II concentrations of hazardous substances that can be partially attributed to Source 1(Ref. 1).

Food Chain Individual Factor Value = 45

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

No Level I concentrations can be documented with the available data.

Level I Concentrations Factor Value = 0

4.1.3.3.2.2 Level II Concentrations

Herring Run is a fishery that has been documented to be subject to Level II concentrations of hazardous substances partially attributable to Source 1 of the 68th Street Dump site. The actual production value for Herring Run is unknown; therefore, the minimum production value is assigned for the area of actual contamination. The human food chain population value is based on HRS Final Rule Table 4-18 (Ref. 1).

Identity of Fishery	Annual Production (lbs)	References	Human Food Chain Population Value
Herring Run	> 0 to 100	9, p. 6; 16; 18; 68; 69; 70; 71; 72; and 76	0.03

Level II Concentrations Factor Value = 0.03

4.1.3.3.2.3 Potential Human Food Chain Contamination

The Back River and Chesapeake Bay are both designated fisheries located within the 15-mile downstream TDL (Ref. 16; Ref. 69; Ref. 70; Ref. 73). Production values for the Back River and the portion of the Chesapeake Bay within the 15-mile surface water TDL are not known, therefore, the potential for human food chain contamination is not scored and is assigned a contamination factor value of greater than zero.

Potential Human Food Chain Contamination Factor Value = > 0

4.1.4 ENVIRONMENTAL THREAT

4.1.4.2 Waste Characteristics

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

See Section 4.1.4.2.1 of the HRS Documentation Record for the ecosystem toxicity/persistence factor values, the environmental bioaccumulation values and the ecosystem toxicity/persistence/bioaccumulation factor values for Source 1. The factor values were assigned from HRS Final Rule Tables 4-20 and 4-21 (Ref. 1).

4.1.4.2.2 Hazardous Waste Quantity

Source HWQ values assigned are summarized below.

Source No.	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (Yes/No)
1	Colgate Pay Dump/Original Landfill	69.8	No
	TOTAL	**69.8***	

* Level II targets have been documented downstream of this source; therefore, a documented HWQ factor value of 100 is assigned (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.4.2.3 Waste Characteristics Factor Category Value

The factor value for the environmental threat is calculated as specified in the HRS Final Rule (Ref. 1). The calculations are presented below.

Ecosystem Toxicity/Persistence Value = 10,000
Ecosystem Bioaccumulation Potential Factor Value = 50,000
HWQ Factor Value = 100
Ecosystem Toxicity/Persistence x HWQ = $1x10^6$

(Ecosystem Toxicity/Persistence x HWQ) x
(Ecosystem Bioaccumulation Potential Factor Value) = $1x10^6 \times 50{,}000 = 5x10^{10}$

Waste Characteristics Factor Category Value = 320

4.1.4.3 Environmental Threat-Targets

- Level I Concentrations

No Level I concentrations of sensitive environments have been documented within the 15-mile downstream TDL.

Most Distant Level II Sample

Sediment sample BR-SD03 was collected in Herring Run. Wetlands are present at this location here that run contiguous to Herring Run (Ref. 8). Hazardous substances (benzo(a)anthracene, benzo(k)fluoranthene, and benzo(a)pyrene) were detected in this sample that were also detected in samples collected from Source 1.

Sample ID:	BR-SD03
Distance from PPE_{1A}:	8,240 feet
Reference:	Figures 2 and 3 in Appendix A

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.2 Level II Concentrations

Sensitive Environments

No listed sensitive environments subject to Level II concentrations have been documented within the 15-mile downstream TDL.

Wetlands - Source 1

The PPE of hazardous substances from Source 1 into surface waters is into the wetlands documented to have covered the majority of Source 1 prior to landfilling. The total length of wetlands documented at Source 1 subject to Level II concentrations of hazardous substances is determined by measuring the total perimeter of historical wetlands documented at Source 1 (Ref. 81, Figure 3). This length, as calculated by the ArcView GIS 3.2 computer program, is 2.02 miles. The assigned HRS wetland rating for Source 1 is 25 (Ref. 1, Table 4-24; Ref. 23; Ref. 81, Figure 3).

4.1.4.3.1.3 Potential Contamination

The Chesapeake Bay is documented as habitat used by threatened species within the 15-mile surface water TDL (Ref. 74). The Chesapeake Bay is coastal tidal waters, therefore the assigned dilution weight of 0.0001 is assigned from the HRS Final Rule, Table 4-13 (Ref. 1).

Chesapeake Bay:

Sensitive Environment	Distance from Probable Point of Entry to Nearest Point of Sensitive Environment	Reference	Sensitive Environment Values
Habitat known to be used by Federal designated or proposed endangered or threatened species:			
Bald Eagle (*Haliaeetus leucocephalus*)	0	75	75
Peregrine Falcon (*falco percyrmus*)	0	75	75

TOTAL: 150

Wetlands

Wetlands not counted as Level II targets occur along the Back River and Chesapeake Bay within the 15-mile downstream TDL. The length of these wetlands are provided below.

Back River

The total length of wetlands subject to potential contamination located along Back River within the TDL is 4.5 miles; therefore the assigned value is 150 (see Figure 6 in Appendix A) (Ref. 1, Table 4-24; Ref. 17).

Chesapeake Bay

The total length of wetlands subject to potential contamination located downstream along the Chesapeake Bay within the TDL is 13.6 miles, therefore the wetlands assigned value is 350 (see Figure 6 in Appendix A) (Ref. 1, Table 4-24; Ref. 17).

Potential Contamination Factor Value

The potential contamination factor value (SP) is calculated as follows:

$$SP = \frac{(W + S)\ D}{10}$$

W = Value assigned for wetlands from HRS Table 4-24.
S = Value assigned for the sensitive environment from HRS Table 4-23.
D = Dilution weight assigned from HRS Table 4-13. Back River and Chesapeake Bay are coastal tidal waters (Ref. 17).

$$SP_{Back\ River} = \frac{(150 + 0)\ .0001}{10} = 0.0015$$

$$SP_{Chesapeake\ Bay} = \frac{(350 + 150)\ .0001}{10} = 0.005$$

$$SP_{Total} = 0.0015 + 0.005 = 0.0065$$

Potential Contamination Factor Value (SP) = 0.0065

APPENDIX D

SOURCE 2 SCORING

SOURCE 2 SCORESHEETS
HORSESHOE LANDFILL

WORKSHEET FOR COMPUTING HRS SITE SCORE
68th STREET DUMP
SOURCE 2

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	NS	
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	100	10,000
2b.	Ground Water to Surface-water Migration Component (from Table 4-25, line 28)	NS	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	100	10,000
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	NS	
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	NS	
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10,000
6.	**HRS Site Score** Divide the value on line 5 by four and take the square root		50.00

NS = Not scored

TABLE 4-1

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
68th STREET DUMP
SOURCE 2

Factor Categories and Factors		Maximum Value	Value Assigned
Drinking Water Threat			
	Likelihood of Release		
1.	Observed Release	550	550
2.	Potential to Release by Overland Flow		
	2a. Containment	10	---
	2b. Runoff	25	---
	2c. Distance to Surface Water	25	---
	2d. Potential to Release by Overland Flow [lines 2a x (2b +2c)] 500	---	
3.	Potential to Release by Flood		
	3a. Containment (Flood)	10	---
	3b. Flood Frequency	50	---
	3c. Potential to Release by Flood [lines 3a x 3b]	500	---
4.	Potential to Release [lines 2d + 3c, subject to a maximum of 500]	500	---
5.	Likelihood of Release [higher of lines 1 and 4]	550	550
	Waste Characteristics		
6.	Toxicity/Persistence	a	10,000
7.	Hazardous Waste Quantity	a	100
8.	Waste Characteristics	100	32
	Targets		
9.	Nearest Intake	50	0
10.	Population		
	10a. Level I Concentrations	b	0
	10b. Level II Concentrations	b	0
	10c. Potential Contamination	b	0
	10d. Population [lines 10a + 10b + 10c]	b	0
11.	Resources	5	0
12.	Targets [lines 9 + 10d + 11]	b	0
	Drinking Water Threat Score		
13.	Drinking Water Threat Score [(lines 5 x 8 x 12)/82,500, subject to a maximum of 100]	100	0

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT
SCORESHEET (Continued)
68th STREET DUMP
SOURCE 2

Factor Categories and Factors Assigned		Maximum Value	Value Assigned
Human Food Chain Threat			
	Likelihood of Release		
14.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
15.	Toxicity/Persistence/Bioaccumulation	a	5×10^8
16.	Hazardous Waste Quantity	a	100
17.	Waste Characteristics	1,000	1,000
	Targets		
18.	Food Chain Individual	50	45
19.	Population		
	19a. Level I Concentrations	b	0
	19b. Level II Concentrations	b	0.03
	19c. Potential Human Food Chain Contamination	b	–
	19d. Population [lines 19a + 19b + 19c]	b	0.03
20.	Targets [lines 18 + 19d]	b	45.03
	Human Food Chain Threat Score		
21.	Human Food Chain Threat Score [(lines 14 x 17 x 20)/82,500, subject to a maximum of 100]	100	100

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT
SCORESHEET (Continued)
68TH STREET DUMP
SOURCE 2

Factor Categories and Factors Assigned		Maximum Value	Value Assigned
Environmental Threat			
	Likelihood of Release		
22.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
23.	Ecosystem Toxicity/Persistence/Bioaccumulation	a	5×10^8
24.	Hazardous Waste Quantity	a	100
25.	Waste Characteristics	1,000	320
	Targets		
26.	Sensitive Environments		
	26a. Level I Concentrations	b	0
	26b. Level II Concentrations	b	25
	26c. Potential Contamination	b	0.0065
	26d. Sensitive Environments [lines 26a + 26b + 26c]	b	
27.	Targets [value from line 26d]	b	25.01
	Environmental Threat Score		
28.	Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a maximum of 60]	60	53.35
	Surface Water Overland/Flood Migration Component Score for a Watershed		
29.	Watershed Score[c] [lines 13 + 21 + 28, subject to a maximum of 100]	100	100
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE			
30.	Component Score (S_{of})[c] [highest score from line 29 for all watersheds evaluated, subject to a maximum of 100]	100	100

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

4.0 SURFACE-WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 DEFINITION OF THE HAZARDOUS SUBSTANCE MIGRATION PATH FOR OVERLAND/FLOOD COMPONENT - SOURCE 2

Prior to landfilling, this source was covered with PEM wetlands, with an unnamed tributary to Herring Run flowing through these wetlands (Ref. 81, Figure 3). The majority of these wetlands were filled-in with landfilled materials. A wetland area, two streams and a pond remain in the center of Source 2 (Ref. 20; Ref. 81, Figure 8). Overland runoff from Source 2 flows from the topographic high where wastes were deposited, toward the center of the source, where wetlands, two streams, and a pond are located. The PPE of overland flow from Source 2 is the wetland area located in the center of Source 2 (PPE_2). These wetlands would discharge into the two streams and the pond located in this area. The two streams located here flow through these wetlands. One of the streams, located to the west, is not directly associated with the pond. The stream located to the east originates from a discharge point at the southeastern end of the pond. The streams flow southeast through the surrounding wetlands and converges to form one stream. The in-water segment for the 15-mile TDL for Source 2 is measured from the northern most point where the wetlands would discharge into the unnamed stream located to the east. This stream continues to flow for approximately 0.23 mile to the southeast until it discharges into Herring Run (Ref. 20) (Figure 4, 5, and 6, which can be found in Appendix A). Herring Run flows in an easterly direction for about 1 mile until it discharges into the Back River. The Back River flows approximately 8.5 miles until it discharges into the Chesapeake Bay. The 15-mile surface water pathway TDL ends in the Chesapeake Bay (see Figures 4 and 6 in Appendix A).

Available data indicates that all of the surface water bodies located along the 15-mile TDL are tidally-influenced (Ref. 16; Ref. 17; Ref. 18; Ref. 62; Ref. 82, Logbook 2, pp. 7, 26, 28, 35, and 38). Data does not exist to document the potential tidal carry of hazardous substances in the area of the site; however, during the April 6 through May 3, 2000 ESI, the sampling team observed and documented the tidal effect on Herring Run (Ref. 82, Logbook 2, pp. 7, 26, 28, 35, and 38). The uppermost reach of the tidal effect was observed at the second overpass of the Interstate 95 highway (Ref. 81; Ref. 82, Logbook 2, p. 7).

4.1.2.1 Likelihood of Release - Source 2

Direct Observation- Source 2

- Basis for Direct Observation - Source 2

Historical aerial photographs document that prior to landfilling the entire area of Source 2 was covered in PEM wetlands (Ref. 81, Figure 3). These historical aerial photographs further document the filling in of 15.6 acres of wetlands with wastes (Ref. 81, pp. 15 and Figures 4 through 7). In addition, indications that hazardous substances in materials deposited at Source 2 were in direct contact with surface waters is supported by the fact that Source 2 is located within the 100-year flood plain (Ref. 86). Baltimore County is nationally identified as an area that suffers severe losses due to floods (Ref. 88, p. 3). Major floods have occurred in Baltimore County in October 1954, August 1955, August 1971, June 1972 and September 1975 (Ref. 64, p. 7; Ref. 87, p. 4). One of the most damaging floods recorded in the Baltimore area occurred on August 1 through 2, 1971. The flood waters recorded in the Back River basin were equivalent to, or in excess of, the 100-year flood interval (Ref. 87, p. 7). A second major flood occurred in Baltimore during Hurricane Agnes, from June 21 through 23, 1972. Flood peaks greater than 100-year intervals were recorded in Baltimore at this time (Ref. 87, p. 7). Because the entire area of Source 2 is located within the 100-year flood zone, the waste that contained hazardous substances, which documentation indicates was disposed of at Source 2 during the 1950s and 1960s, was in direct contact with these flood waters. The National Climatic Data Center (NCDC) has documented several, more recent storm events (June 1996, September 1999, and July 14, 2000) that have caused flash flooding in the area where the 68th Street Dump site is located (Ref. 63). In 1996, Hurricane Fran produced stream flows in Maryland among the highest ever seen and in 1999 heavy downpours (4.77 inches fell in the space of a few hours) led to major flooding in the Baltimore area (Ref. 89, p.1; Ref. 90, p. 1). Analytical results from the samples collected from Source 2 in 1986, 1993 and in April 2000 document that hazardous substances were present at Source 2 during these flash flood events. Additional evidence that the area of the 68th Street Dump is prone to flash floods is provided by observations of the banks of Herring Run and Moore's Run. The banks of these streams adjacent to the 68th Street Dump site show evidence of the increase in flow due to storm events (Ref. 15, p. 5; Ref. 18; Ref. 68; Ref. 69; Ref. 76). Exposed landfilled materials have been observed in Herring Run due to erosion of its bank (Ref. 69).

- Hazardous Substances in the Release - Source 2

Information gathered during EPA investigations provides documentation of hazardous waste deposition at the 68th Street Dump by Robb Tyler. From the early 1950s through the 1970s, wastes from various industries located in the Baltimore area were disposed of at the five sources that comprise the 68th Street Dump. Written testimonies from haulers and former employees of Robb Tyler indicate that all types of waste was accepted at the site (Ref. 10, pp. 4, 14, 17, 24, 38, 49, 50, 105, 155, 156, and 157). According to Robb Tyler, prior to the 1960s, there were no restrictions on the types of wastes that could be dumped at the landfill. Mr. Tyler further testified that drummed liquid wastes were disposed of at the 68th Street Dump site and stated that if "they could resell the drums brought in they would do so" (Ref. 84, p. 75). A former employee also testified that wastes in drums were dumped out so that Robb Tyler could sell the drums (Ref. 83, p. 23). These statements indicate that the wastes contained in the drums were disposed of directly into the wetlands that covered all five source areas, including Source 2, during the 1950s and 1960s (Ref. 81, Figures 4 and 5). Information is available for some of the generators of wastes disposed

of at the site. The generators, wastes streams, and hazardous substances documented in these waste streams have been summarized in Table 1 in Appendix B.

EPA interviews conducted of former Robb Tyler employees and waste haulers provides evidence that wastestreams generated by the following companies were disposed of at Source 2: Baltimore Gas and Electric; Allied Chemical; Western Electric; Noxell Corporation; Signode Steel; GAF Materials; Armco; Koppers; General Motors; Crown, Cork, & Seal; Bruning Paint Company; SCM (Glidden Durkee, Co.); and the Baltimore Sun. Hazardous substances associated with the waste streams generated by these industries include trivalent chromium, potassium bichromate, copper, kepone, arsenic, chromium, fluoboric acid, cyanide acid, trichloroethene, sodium hydroxide, acetone, waste enamel, PAHs, PCBs, iron oxides, manganese, silicone, tin, mercury, paint waste, antimony, barium, cadmium, iron, nickel, zinc, hexavalent chromium, selenium, silver, ammonia nitrate, phenol, diethanolamine, xylol, ketone, isophorone, methyl ethyl ketone, nitric acid, chromic acid, methyl isobutyl ketone, sulphuric acid, chromate pigments, phosphoric acid, barium, cryolite-asbestos, potassium nitrate, lead oxide, sodium nitrate, solvents, ink, and 1,1,1-trichloroethane (see Table 1 in Appendix B for references).

Samples Collected In Areas Historically Covered In Wetlands

Further evidence that hazardous substances were deposited directly into the wetlands of Source 2 is provided by laboratory analytical results of sampling events conducted at these sources. Samples were collected in 1993 by MDE, and in 2000 by the EPA Region 3 SATA team. Analytical results for the samples are provided as evidence of hazardous substance deposition into wetlands because the samples were collected at Source 2 in locations documented by historical aerial photographs to have at one time been covered in wetland vegetation. These aerial photographs further document the disposal of wastes into these wetlands (Ref. 6, pp. 6 through 15; Ref. 81). The waste disposed of at this source has not been removed; therefore, the analytical results summarized in the tables below document the hazardous substances present in the waste that was directly deposited into the wetlands of Source 2.

MDE Sample Results - 1993

In 1993, the MDE collected samples from Source 2. The area where these samples were collected was in an area historically covered in PEM wetlands (Ref. 81, Figure 3). These samples were analyzed in accordance with CLP protocols (Ref. 9, pp. 18, 20, and 47). Two samples, Soil-5 and Soil-6, were collected to establish background concentrations of metals (Ref. 9, pp. 20, 23, 24, and 27). These background concentrations have been used to determine the significance of the metals detected at Source 2. If the metal was detected in both background samples the sample with the higher concentration was used as the comparative sample. The table below presents the sample with the highest concentration of each hazardous substance detected at Source 2 (for a complete list of all contaminated samples see Section 2.2).

Hazardous Substance	Evidence	Concentration (µg/kg)	SQL (µg/kg)	Reference
Organics				
Dieldrin	Soil-15	960 J	440	9, p. 168;79

Hazardous Substance	Evidence	Concentration (mg/kg)	Background Concentration (Soil-5 or Soil-6) (mg/kg)	SQL (mg/kg)	Reference
Metals					
Cadmium	Soil-15	10.8	ND	2.3	9, pp. 111, 113, 214, 231 and 232; 79
Chromium	Soil-15	417	29.3 J	4.6	9, pp. 111, 113, 214, 231 and 232; 79
Copper	Soil-15	798	25.8	11.5	9, pp. 111, 113, 214, 231 and 232; 79
Lead	Soil-15	723	201 J	1.38	9, pp. 111, 113, 214, 231 and 232; 79
Mercury	Soil-15	14.6	0.28	0.23	9, pp. 111, 113, 214, 231 and 232; 79
Nickel	Soil-15	25.1	[6.1]	18.4	9, pp. 111, 113, 214, 231 and 232; 79
Silver	Soil-15	47.3	ND	4.6	9, pp. 111, 113, 214, 231 and 232; 79
Zinc	Soil-15	658	77.0	9.2	9, pp. 111, 113, 214, 231 and 232;79

Notes:
- CRDL Contract-required detection limit
- CRQL Contract-required quantitation limit
- ND Not detected above the detection limit
- mg/kg Milligrams per kilogram
- µg/kg Micrograms per kilogram

Analytical Data Qualifiers:
- J Analyte present; reported value may not be accurate or precise
- [ ] Analyte present; as values approach the instrument detection limit the quantitation may not be accurate

EPA SATA Team Sample Results - 2000

Analytical results from samples collected as part of the ESI conducted in 2000 by the EPA SATA team provides further documentation of the hazardous substances disposed of into the wetlands of Source 2. These samples were collected from locations documented by historical aerial photographs to have at one time been covered with wetland vegetation. These aerial photographs further document the disposal of wastes into these wetlands (Ref. 12, pp. 14 through 29; Ref. 81). Sampling locations are provided in Figures 2 and 3 in Appendix A. These samples were analyzed for organic and inorganic parameters using CLP laboratory protocols. The samples collected for organic analysis were analyzed for SVOCs, PCBs and pesticides. The samples analyzed for inorganic analysis were analyzed for total metals. To identify metal concentrations exceeding background levels, the metal concentrations detected at Source 2 were compared to the concentrations detected in soil sample CPBWSS-01A, which was collected outside the influence of the site (Ref. 7, p. 12). Only select analytical results are provided in the table below (for a complete list of all contaminated samples collected from Source 2 see Section 2.2, Source Characterization).

Hazardous Substance	Evidence	Concentration (µg/kg)	SQL (µg/kg)	Reference
Organics				
1,1'-Biphenyl	HSLF-WS15B	550 J	4,388	7, p. 95
2-Methylnaphthalene	HSLF-WS12B	180,000	155,327	7, p. 95
Acenaphhthene	HSLF-WS15B	4,800	4,388	7, p. 95
Anthracene	HSLF-WS15B	6,700	4,388	7, p. 96
Benzo(a)anthracene	HSLF-WS15B	12,000	4,388	7, p. 96
Benzo(b)fluoranthene	HSLF-WS15B	8,100	4,388	7, p. 96
Benzo(k)fluoranthene	HSLF-WS15B	9,700	4,388	7, p. 96
Benzo(a)pyrene	HSLF-WS15B	11,000	4,388	7, p. 96
Benzo(g,h,i)perylene	HSLF-WS15B	2,800 J	4,388	7, p. 96
Butylbenzylphthalate	HSLF-WS15B	4,400	4,388	7, p. 96
Carbazole	HSLF-WS03B	2,400 J	4,388	7, p. 94
Chrysene	HSLF-WS15B	12,000	4,388	7, p. 96
Dibenzofuran	HSLF-WS03B	3,000 J	12,011	7, p. 94
	HSLF-WS15B	3,800 J	4,388	7, p. 96
Dibenz(a,h)anthracene	HSLF-WS15B	1,700 J	4,388	7, p. 96
2,4-Dimethylphenol	HSLF-WS12B	6,000 J	155,327	7, p. 95
Fluoranthene	HSLF-WS15B	19,000	4,388	7, p. 96
Fluorene	HSLF-WS15B	4,800	4,388	7, p. 96
gamma-chlordane	HSLF-WS01A	32	2.3	7, p. 97
Indeno(1,2,3-cd)-pyrene	HSLF-WS01A	1,200	895	7, p. 94
Phenanthrene	HSLF-WS15B	19,000	4,388	7, p. 96

Hazardous Substance	Evidence	Concentration (µg/kg)	SQL (µg/kg)	Reference
Pyrene	HSLF-WS15B	17,000	4,388	7, p. 96
Aroclor-1242	HSLF-WS07C	1,300 + J	242.6	7, p. 97
Aroclor-1254	HSLF-WS07C	520 J	48.5	7, p. 97

Hazardous Substance	Evidence	Concentration (mg/kg)	Background Concentration (CPBWSS-01A) (mg/kg)	SQL (mg/kg)	Reference
Metals					
Antimony	HSLF-WS09B	23.1 L	ND	19.4	7, pp. 12, 33, 87
Arsenic	HSLF-WS03B	76.6	4.3 L	2.97	7, pp. 12, 32, 87
Barium	HSLF-WS07C	582	118.0	66.9	7, pp. 12, 32, 87
Cadmium	HSLF-WS09C	203,000 +J	ND	1.3	7, pp. 12, 33, 87
Chromium	HSLF-WS07C	175	27	3.3	7, pp. 12, 32, 87
Copper	HSLF-WS02B	667	33.7	5.9	7, pp. 12, 32, 87
Lead	HSLF-WS07B	3,740 J	101	0.9	7, pp. 12, 32, 87
Mercury	HSLF-WS03B	4.5	0.18	0.14	7, pp. 12, 32, 87
Nickel	HSLF-WS07C	211	16.3	13.4	7, pp. 12, 32, 87
Silver	HSLF-WS09B	8.6 K	ND	3.2	7, pp. 12, 33, 87
Zinc	HSLF-WS03B	10,800	142	5.9	7, pp. 12, 32, 87

Notes:
- CRDL Contract-required detection limit
- CRQL Contract-required quantitation limit
- ND Not detected above the detection limit
- mg/kg Milligrams per kilogram
- µg/kg Micrograms per kilogram

Analytical Data Qualifiers:
- J Analyte present; reported value may not be accurate or precise
- K Analyte present; reported value may be biased high
- L Analyte present; reported value may be biased low
- \+ Reported value result of diluted sample

EPA SATA Team Wetland Sample Results - 2000

Although the majority of the wetlands documented to have at one time existed at Source 2 have been lost due to landfilling, a small wetland area remains in the center of the source (Ref. 20; Ref. 81, Figure 8). Documentation that waste containing hazardous substances were deposited directly into wetlands at Source 2 is documented by the laboratory analysis of samples collected from wetlands that remain at the source. The table below summarizes the samples collected during the 2000 ESI from these wetlands. These samples were analyzed under EPA's CLP (Ref. 7, p. 1). To identify metal concentrations exceeding background levels, the metal concentrations detected in these wetland samples were compared to the analytical results from a sediment sample collected from a wetland located outside the influence of the site. This sample was collected in a wetland area located along Herring Run, upstream of the 68th Street Dump site. The sample was collected by the EPA Region 3 START in February 2001 and was analyzed for the same parameters as the samples collected from Source 2 (TCL organics and TAL metals by an EPA CLP laboratory) (Ref. 65). All sampling locations are shown on Figures 2 and 3 in Appendix A.

Hazardous Substance	Evidence	Source No.	Concentration* (µg/kg)	SQL (µg/kg)	Reference
Organics					
alpha-Clordane	HSLF-SD01	2	10	6.23	7, p. 101; 79

Hazardous Substance	Evidence	Source	Concentration* (mg/kg)	Background Concentration (SED-01) (mg/kg)	SQL (mg/kg)	Reference
Metals						
Chromium	HSLF-SD01	2	133 L	21.6	8.1	7, p. 34; 79
	HSLF-SD02	2	123 L	21.6	9.7	7, p. 34; 79
Copper	HSLF-SD01	2	116	28.5	20.1	7, p. 34; 79
	HSLF-SD02	2	117	28.5	24.1	7, p. 34; 79
Lead	HSLF-SD01	2	418 J (290)	49.8	2.4	7, p. 34; 79
	HSLF-SD02	2	456 J (317)	49.8	2.9	7, p. 34; 79
Nickel	HSLF-SD01	2	60.7	15.8	32.3	7, p. 34; 79
	HSLF-SD02	2	70.0	15.8	38.7	7, p. 34; 79
Zinc	HSLF-SD01	2	914	75.1	16.1	7, p. 34; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

ND Not detected above the SQL

SQL Sample quantitation limit; SQL calculations provided in reference 79

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

K Analyte present; reported value may be biased high

L Analyte present; reported value may be biased low

Chemical Analysis - Source 2

- MDE ESI Sample Results

During the 1993 MDE ESI, two samples were collected from the unnamed tributary that originates in the center of Source 2. No background sample can be collected from this stream because this stream originates on the source; therefore, concentrations of hazardous substances in these samples were compared to analytical results for a background sample collected in Redhouse Run. The sample collected in Redhouse Run was chosen as a suitable background sample because it was collected within the same environmental setting of the 68th Street site; it was collected during the same sampling event and analyzed by the same CLP laboratory as the release samples; and Redhouse Run is a similar size and flow as the unnamed tributary (Ref. 9, p. 18; Ref. 17; Ref. 20).

- Background Sample - Sediments

Sample ID	Sample Location	Depth (inches)	Date	Reference
SED-4	Redhouse Run	Unknown	6/2/93 - 6/3/93	9, pp. 19, 153

- Background Sample - Aqueous

Sample ID	Sample Location	Date	Reference
SW-4	Redhouse Run	6/2/93 - 6/3/93	9, pp. 19, 115

- Background Concentrations - Sediments

Sample ID	Hazardous Substance	Sample* Concentration (ug/kg)	SQL (ug/kg)	Reference
Organics				
SED-4	Benzo(a)pyrene	ND	600	9, pp. 153, 277; 79
	Benzo(g,h,i)perylene	ND	600	9, pp. 153, 277; 79
	Chrysene	ND	600	9, pp. 153, 277; 79
	Phenanthrene	ND	600	9, pp. 153, 277; 79
	Pyrene	ND	600	9, pp. 153, 277; 79
Metals		**(mg/kg)**	**SQL (mg/kg)**	
SED-4	Cadmium	ND	4.5	9, pp. 112, 218; 79
	Chromium	19.0 J (24.51)	8.9	9, pp. 112, 218; 79
	Copper	ND	22.3	9, pp. 112, 218; 79
	Lead	30.0	2.7	9, pp. 112, 218; 79
	Mercury	ND	0.45	9, pp. 112, 218; 79
	Nickel	ND	35.7	9, pp. 112, 218; 79
	Zinc	60.9	17.9	9, pp. 112, 218; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

ND Not detected above the SQL

SQL Sample quantitation limit; SQL calculations shown in reference 79

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

- Background Concentrations - Aqueous

Sample ID	Hazardous Substance	Sample Concentration (µg/L)	CRDL (µg/L)	Reference
SW-4	Chromium	ND	10	9, p. 115
	Copper	ND	25	9, p. 115
	Lead	3.7 B	3	9, pp.104, 115
	Manganese	126 B	15	9, pp. 104, 115
	Zinc	ND	20	9, p. 115

Notes:
CRDL Contact-required detection limit
µg/L Micrograms per liter
ND Not detected above the CRDL
Analytical Data Qualifiers:
B Not detected substantially above the level reported in laboratory or field blanks

- Release Samples - Sediments

Sample ID	Sample Location	Depth (inches)	Date	Reference
SED-1	Unnamed tributary to Herring Run	Unknown	6/3/93	9, pp. 19, 110, 171
SED-2	Unnamed tributary to Herring Run	Unknown	6/3/93	9, pp. 19, 110, 171

- Release Samples - Aqueous

Sample ID	Sample Location	Date	Reference
SW-1	Unnamed tributary to Herring Run	6/3/93	9, pp. 19, 114, 171

- Release Concentrations -Sediments

Sample ID	Hazardous Substance	Sample Concentration* (µg/kg)	SQL (µg/kg)	Reference
Organics				
SED-1	Benzo(a)pyrene	610	550	9, pp. 162, 320; 79
	Benzo(g,h,i)perylene	610	550	9, pp.162, 320; 79
	Chrysene	670	550	9, pp.162, 320; 79
	Phenanthrene	650	550	9, pp.162, 320; 79
	Pyrene	1,000	550	9, pp.162, 320; 79
SED-2	Benzo(a)pyrene	700	611	9, pp.162, 321; 79
	Chrysene	760	611	9, pp.162, 321; 79
	Phenanthrene	670	611	9, pp.162, 321; 79
	Pyrene	1,100	611	9, pp.162, 321; 79
Metals		**(mg/kg)**	**SQL (mg/kg)**	
SED-1	Cadmium	3.4 K (2.41)	2.5	9, pp. 110, 204; 79
	Chromium	191	4.9	9, pp. 110, 204; 79
	Copper	189	12.3	9, pp. 110, 204; 79
	Lead	591	1.5	9, pp. 110, 204; 79
	Mercury	0.55	0.2	9, pp. 110, 204; 79
	Nickel	107	19.7	9, pp. 110, 204; 79
	Zinc	647	9.9	9, pp. 110, 204; 79
SED-2	Copper	42.7	3	9, pp. 110, 205; 79
	Lead	92.2	0.9	9, pp. 110, 205; 79
	Mercury	0.21	0.15	9, pp. 110, 205; 79
	Nickel	25.4	12.4	9, pp. 110, 205; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

ND Not detected above the SQL

SQL Sample quantitation limit; SQL calculations presented in reference 79

Analytical Data Qualifiers:

K Analyte present; reported value may be biased high

- Release Concentrations - Aqueous

Sample ID	Hazardous Substance	Sample Concentration (µg/L)	CRDL (µg/L)	Reference
SW-1	Chromium	38.6	10	9, p. 114
	Copper	59.5	25	9, p. 114
	Lead	157	3	9, p. 114
	Manganese	476	15	9, p. 114
	Zinc	245	20	9, p. 114

Notes:
CRDL Contract-required detection limit
µg/L Micrograms per liter

- EPA SATA Team Sample Results - 2000

An observed release by chemical analysis can also be documented by the analytical results from samples collected during the ESI completed by the EPA Region 3 SATA team in 2000. Samples HSLF-SW/SD01 and HSLF-SW/SD02 were collected at the pond-wetland boundary. Samples HSLF-SD03 and HSLF-SD05 were collected in the northern branch of the unnamed tributary to Herring Run. To determine significance above background, the concentrations of hazardous substances detected in sediment samples HSLF-SD01 and HSLF-SD02 were compared to the analytical results from a sediment sample collected from a wetland located outside the influence of the site. This sample was collected in a wetland area located along Herring Run, upstream of the 68th Street Dump site. The sample was collected by the EPA Region 3 Superfund Technical Assistance and Response Team (START) in February 2001and was analyzed for the same parameters as the release samples (TCL organics and TAL metals by an EPA CLP laboratory) (Ref. 65). No aqueous sample was collected from this wetland area, therefore the analytical results for aqueous samples collected from the wetland area at Source 2 (HSLF-SW01 and HSLF-SW02) were compared to the analytical results for an aqueous sample collected from a wetland area located outside the influence of the 68th Street Dump site (see Figure 3 in Appendix A; Ref. 92). This aqueous sample, WTBSW-01 was collected at the same time as the release samples, and was analyzed by the same CLP laboratory (Ref. 7, pp. 1, 12, and 18).

- Background Samples - Sediments

Sample ID	Sample Location	Depth (inches)	Date	Reference
SED-01	Wetland	0-6	2/1/01	65, p. 4
RHRSD-01	Redhouse Run	0-6	5/3/00	7, p. 20; 82, Logbook 1, p. 5 and Logbook 2, p. 39

-Background Samples - Aqueous

Sample ID	Sample Location	Date	Reference
WTBSW-01	Wetland	5/17/00	7, p. 18; 75

- Background Concentrations - Sediments

Sample ID	Hazardous Substance	Sample Concentration (µg/kg)	SQL (µg/kg)	Reference
Organics				
SED-1	Aroclor-1254	ND	64.1	65, p. 26; 79
RHRSD-01	Aroclor-1254	ND	40.7	7, p. 215; 79
Metals		(mg/kg)	SQL (mg/kg)	
SED-1	Barium	103	74	65, p. 5; 79
	Chromium	21.6	3.7	65, p. 5; 79
	Copper	28.5	9.3	65, p. 5; 79
	Lead	49.8	1.1	65, p. 5; 79
	Nickel	15.8	14.8	65, p. 5; 79
	Zinc	75.1	7.4	65, p. 5; 79
RHRSD-01	Barium	ND	51.9	7, p. 80; 79
	Chromium	10.9	2.6	7, p. 80; 79
	Lead	18.1 B	0.8	7, p. 80; 79
	Nickel	ND	10.4	7, p. 80; 79
	Zinc	51.8	5.2	7, p. 80; 79

Notes:
- µg/kg Micrograms per kilogram
- mg/kg Milligrams per kilogram
- ND Not detected above the SQL
- SQL Sample quantitation limit; SQL calculations presented in reference 79

Analytical Data Qualifiers:
- B Not detected substantially above the level reported in laboratory or field blanks
- [ ] Analyte present; as values approach the instrument detection limit the quantitation may not be accurate

- Background Concentrations - Aqueous

Sample ID	Hazardous Substance	Sample Concentration (µg/L)	CRDL (µg/L)	Reference
WTBSW-01	Chromium	ND	10	7, p. 85
	Lead	ND	3	7, p. 85
	Zinc	ND	20	7, p. 85

Notes:

B	Not detected substantially above the level reported in laboratory or field blanks
CRDL	Contract-required detection limit
µg/L	micrograms per liter
ND	Not detected above the contract-required detection limit

- Release Samples - Sediments

Sample ID	Sample Location	Depth (inches)	Date	Reference
HSLF-SD01	Pond/wetland area in center of Source 3	0-6	4/6/00	7, p. 12; 18; 82, Logbook 1, p. 5
HSLF-SD02	Pond/wetland area in center of Source 3	0-6	4/6/00	7, p. 12; 18; 82, Logbook 1, pp. 5 and 6
HSLF-SD03	Unnamed tributary to Herring Run located in center of Source 3	0-6	4/6/00	7, p. 12; 18; 82, Logbook 1, pp. 5 and 6
HSLF-SD05	Unnamed tributary to Herring Run located in center of Source 3	0-6	4/6/00	7, p. 13; 18; 82, Logbook 1, pp. 5 and 7

- Release Samples - Aqueous

Sample ID	Sample Location	Date	Reference
HSLF-SW01	Pond/wetland area in center of Source 3	4/6/00	7, p. 13; 82, Logbook 1, p. 5
HSLF-SW02	Pond/wetland area in center of Source 3	4/6/00	7, p. 13; 82, Logbook 1, p. 6

- Release Concentrations - Sediments

Sample ID	Hazardous Substance	Sample* Concentration (µg/kg)	SQL (µg/kg)	Reference
Organics				
HSLF-SD05	Aroclor-1254	52	47.1	7, p. 101; 79
Metals		**(mg/kg)**	**SQL (mg/kg)**	
HSLF-SD01	Barium	515	161.3	7, p. 34; 79
	Chromium	133 L	8.1	7, p. 34; 79
	Copper	116	8.1	7, p. 34; 79
	Lead	418 J (290)	2.4	7, p. 34; 79
	Nickel	60.7	32.3	7, p. 34; 79
	Zinc	914	16.1	7, p. 34; 79
HSLF-SD02	Chromium	123 L	9.7	7, p. 34; 79
	Copper	117	9.7	7, p. 34; 79
	Lead	456 J (317)	2.9	7, p. 34; 79
	Nickel	70.0	38.7	7, p. 34; 79
HSLF-SD03	Barium	208	86.8	7, p. 34; 79
	Chromium	72.0 L	4.3	7, p. 34; 79
	Lead	203 J (141)	1.3	7, p. 34; 79
	Nickel	42.6	17.4	7, p. 34; 79
	Zinc	294	8.7	7, p. 34; 79
HSLF-SD05	Zinc	395	6.1	7, p. 34; 79

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

µg/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

ND Not detected above the quantitation or detection limit

SQL Sample quantitation limit; calculations are presented in reference 79

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

L Analyte present; reported value may be biased low

- Release Concentrations - Aqueous

Sample ID	Hazardous Substance	Sample Concentration (µg/L)	CRDL (µg/L)	Reference
HSLF-SW01	Chromium	22.4	10	7, p. 35
	Lead	109	3	7, p. 35
	Zinc	133	20	7, p. 35
HSLF-SW02	Lead	97.9	3	7, p. 35

Notes:

B	Not detected substantially above the level reported in laboratory or field blanks
CRDL	Contract-required detection limit
µg/L	micrograms per liter

Attribution - Source 2

As documented in the source description section for Source 2, Robb Tyler disposed of wastes that contained hazardous substances at Source 2. Historical aerial photographs document the disposal of these wastes. Hazardous substances detected in the release samples were also detected at elevated levels from samples collected from the source and in wetland and stream samples collected from areas that receive rainfall runoff from Source 2 (Ref. 20). A radio facility consisting of a transmitter station building and associated antenna towers were also located in the area of Source 2. This radio facility is first visible on the May 18, 1964 aerial photograph of the area (Ref. 6, p. 12 and 13). At one time this building contained PCBs (Ref. 9, p. 4). A Phase I Environmental Site Assessment was performed in 1991 for this building and associated transmitter sites. The interiors of six transmitter towers were inspected. No evidence of previous spills or leaks of PCB-containing fluids was observed at this time (Ref. 9, pp. 63 through 68). No other potential sources of the hazardous substances documented in the release have been identified at this time.

Hazardous Substances in the Release

Aroclor-1254
Barium
Benzo(a)pyrene
Benzo(g,h,i)perylene
Cadmium
Chromium
Chrysene
Copper
Lead
Manganese
Mercury
Nickel
Phenanthrene
Pyrene
Zinc

4.1.2.2 WASTE CHARACTERISTICS

4.1.2.2.1 Toxicity/Persistence

See Section 4.1.2.2 of the HRS documentation record for the toxicity/persistence factor values for all hazardous substances detected at Source 2.

Highest Toxicity/Persistence Value = 10,000

4.1.2.2.2 Hazardous Waste Quantity

Source HWQ values assigned are summarized below.

Source No.	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (Yes/No)
2	Horseshoe Landfill	20.1	No
	TOTAL	**20.1***	

* Level II targets have been documented downstream of this source; therefore, an HWQ factor value of 100 is assigned (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.2.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor value for the drinking water threat is calculated below, as specified in the HRS Final Rule Section 2.4.3.1 (Ref. 1):

Toxicity/Persistence Factor Value = 10,000
HWQ Factor Value = 100
Toxicity/Persistence Factor Value (10,000) × HWQ Factor Value (100) = 1×10^6

Waste Characteristics Factor Category Value (Ref. 1, Table 2-7) = 32

4.1.2.3 DRINKING WATER TARGETS

There are no drinking water intakes located within the 15-mile TDL; therefore, the drinking water threat was not scored (Ref. 67).

4.1.3.2 Waste Characteristics

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

See Section 4.1.2.2 of the HRS documentation Record for the toxicity/persistence factor values, the human food chain bioaccumulation values, and the combined toxicity/persistence/bioaccumulation factor values for all hazardous substances detected at Source 2.

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Toxicity/Persistence/Bioaccumulation Factor Value = 5 X 10^8

4.1.3.2.2 Hazardous Waste Quantity

Source HWQ values assigned are summarized below.

Source No.	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (Yes/No)
2	Horseshoe Landfill	20.1	No
	TOTAL	**20.1**	

* Level II targets have been documented downstream of this source; therefore, an HWQ factor value of 100 is assigned (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.3.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor value for the human food chain threat is calculated below, as specified in the HRS Final Rule (Ref. 1, Section 4.1.3.2.3):

Toxicity/Persistence Factor Value = 10,000
HWQ Factor Value = 100
Bioaccumulation Potential Factor Value (BPFV) = $5x10^{8}$

Toxicity/Persistence Factor Value (10,000) × HWQ Value (100) = 1×10^{6}
1×10^{6} × BPFV ($5x10^{8}$) = Waste Characteristics Product ($5x10^{14}$) (subject to maximum limit value at 1×10^{12})

Waste Characteristics Factor Category Value (Ref. 1, Table 2-7) = 1,000

Waste Characteristics Factor Category Value = 1,000

4.1.3.3 HUMAN FOOD CHAIN THREAT-TARGETS

Actual Human Food Chain Contamination

Herring Run has been established as a fishery along the entire 15-mile TDL (see Section 4.1.3.3 of the documentation record).

Sediment Samples - Herring Run

Sediment samples collected from Herring Run that contained hazardous substances having a bioaccumulation potential factor value of 500 or greater and that meet the criteria for an observed release are presented below. Hazardous substances detected in sediment samples collected downstream of all five sources were also detected at each individual source; therefore the release of these hazardous substances is partially attributable to each of the sources identified at the 68th Street Dump site. These samples are documented in the observed release section, Section 4.1.2.1.1 for the overall site. The bioaccumulation potential factor values are also provided in Section 4.1.3.2.1 of the documentation record of the entire site.

Sample ID	Downstream of Source No.	Hazardous Substance	Sample Concentration* (µg/kg)	Bioaccumulation Value
Organics				
BR-SD03	1,2,3,4,5	Benzo(a)anthracene	650	50,000
		Benzo(k)fluoranthene	620	50,000
		Benzo(a)pyrene	680	50,000
Sample ID		**Hazardous Substance**	**Sample Concentration (mg/kg)**	**Bioaccumulation Value**
Metals				
BR-SD04	1, 2, 3, 4, 5	Zinc	464 L	500
BR-SD06	1, 2, 3, 4, 5	Zinc	327	500

Notes:

* All qualified data has been adjusted in accordance with EPA's fact sheet entitled "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 19). Where an adjustment is required, the adjusted value is shown in parenthesis.

mg/kg Milligrams per kilogram

µg/kg Micrograms per kilogram

Analytical Data Qualifiers:

J Analyte present; reported value may not be accurate or precise

L Analyte present; reported value may be biased low

Closed Fisheries

No closed fisheries have been established within the 15-mile TDL.

Level I Concentrations

No Level I concentrations have been established.

Most Distant Level II Sample

An observed release of the hazardous substance benzo(a)pyrene was separately documented for Source 2. Sediment sample BR-SD03 detected benzo(a)pyrene in the Herring Run fishery downstream of PPE_2.

Sample ID: BR-SD03
Distance from PPE_2: 3,452 feet
Reference: Figures 2, 3, and 6 in Appendix A

Level II Fisheries

A hazardous substance that has a bioaccumulation potential factor value of 500 or greater was detected in a sediment sample collected from Herring Run. The extent of Level II fisheries that can be documented for Source 2 includes the distance from where the unmanned tributary that receives drainage from Source 2 discharges into Herring Run to sediment sampling location BR-SD03.

Identity of Fishery	Extent of the Level II Fishery
Herring Run	3,452 feet

4.1.3.3.1 Food Chain Individual

A food chain individual factor value of 45 is assigned for Source 2 site because a portion of the Herring Run fishery is subject to Level II concentrations of hazardous substances that can be partially attributed to migration from Source 2 (Ref. 1).

Food Chain Individual Factor Value = 45

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

No Level I concentrations can be documented with the available data.

Level I Concentrations Factor Value = 0

4.1.3.3.2.2 Level II Concentrations

Herring Run is a fishery that has been documented to be subject to Level II concentrations of hazardous substances partially attributable to Source 2 the 68th Street Dump site. The actual production value for Herring Run is unknown; therefore, the minimum production value is assigned for the area of actual contamination. The human food chain population value is based on HRS Final Rule Table 4-18 (Ref. 1).

Identity of Fishery	Annual Production (lbs)	References	Human Food Chain Population Value
Herring Run	> 0 to 100	9, p. 6; 16; 18; 68; 69; 70; 71; 72; and 76	0.03

Level II Concentrations Factor Value = 0.03

4.1.3.3.2.3 Potential Human Food Chain Contamination

The Back River and Chesapeake Bay are both designated fisheries located within the 15-mile downstream TDL (Ref. 16; Ref. 69; Ref. 70; Ref. 73). Production values for the Back River and the portion of the Chesapeake Bay within the 15-mile surface water TDL are not known, therefore, the potential for human food chain contamination is not scored and is assigned a contamination factor value of greater than 0.

Potential Human Food Chain Contamination Factor Value = >0

4.1.4 ENVIRONMENTAL THREAT

4.1.4.2 Waste Characteristics

4.1.4.2.1 <u>Ecosystem Toxicity/Persistence/Bioaccumulation</u>

See Section 4.1.4.2.1 of the HRS Documentation Record for the ecosystem toxicity/persistence factor values, the environmental bioaccumulation values and the ecosystem toxicity/persistence/bioaccumulation factor values for Source 2. The factor values were assigned from HRS Final Rule Tables 4-20 and 4-21 (Ref. 1).

4.1.4.2.2 Hazardous Waste Quantity

Source HWQ values assigned are summarized below.

Source No.	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (Yes/No)
2	Horseshoe Landfill	20.1	No
	TOTAL	**20.1***	

* Level II targets have been documented downstream of this source; therefore, an HWQ factor value of 100 is assigned (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value = 100

4.1.4.2.3 Waste Characteristics Factor Category Value

The factor value for the environmental threat is calculated as specified in the HRS Final Rule (Ref. 1). The calculations are presented below.

Ecosystem Toxicity/Persistence Value = 10,000
Ecosystem Bioaccumulation Potential Factor Value = 50,000
HWQ Factor Value = 100
Ecosystem Toxicity/Persistence x HWQ = $1x10^6$

(Ecosystem Toxicity/Persistence x HWQ) x
(Ecosystem Bioaccumulation Potential Factor Value) = $1x10^6 \times 50{,}000 = 5x10^{10}$

Waste Characteristics Factor Category Value = 320

4.1.4.3 Environmental Threat-Targets

- Level I Concentrations

No Level I concentrations of sensitive environments have been documented within the 15-mile downstream TDL.

Most Distant Level II Sample

Sediment sample BR-SD03 was collected in Herring Run. Wetlands are present at this location that run contiguous to Herring Run (Ref. 81). Hazardous substances (benzo(a)anthracene, benzo(k)fluoranthene, and benzo(a)pyrene) that were detected in this sample were also detected in samples collected from Source 2.

Sample ID: BR-SD03
Distance from unnamed tributary discharge into Herring Run: 3,452 feet
Reference: Figures 2 and 3 in Appendix A

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.2 Level II Concentrations

Sensitive Environments

No listed sensitive environments subject to Level II concentrations have been documented within the 15-mile downstream TDL.

Total Length of Wetlands - Source 2

The PPE of hazardous substances from Source 2 into surface waters is into the wetlands documented to have covered the entire area of Source 2 prior to landfilling. The total length of wetlands documented at Source 2 subject to Level II concentrations of hazardous substances is determined by measuring the total perimeter of Source 2. This length is 0.96 mile; therefore, the assigned HRS wetland rating for Source 2 is 25 (Ref. 1, Table 4-24; Ref. 23; Ref. 81, Figure 3).

4.1.4.3.1.3 Potential Contamination

The Chesapeake Bay is documented as habitat used by threatened species within the 15-mile surface water TDL (Ref. 75). The Chesapeake Bay is coastal tidal waters, therefore the assigned dilution weight of 0.0001 is assigned from the HRS Final Rule, Table 4-13 (Ref. 1).

Chesapeake Bay:

Sensitive Environment	Distance from Probable Point of Entry to Nearest Point of Sensitive Environment	Reference	Sensitive Environment Values
Habitat known to be used by Federal designated or proposed endangered or threatened species:			
Bald Eagle (*Haliaeetus leucocephalus*)	0	75	75
Peregrine Falcon (*falco percyrmus*)	0	75	75

TOTAL: 150

Wetlands

Wetlands not counted as Level II targets occur along the Back River and Chesapeake Bay within the 15-mile downstream TDL. The length of these wetlands are provided below.

Back River

The total length of wetlands subject to potential contamination located along Back River within the TDL is 4.5 miles; therefore the assigned value is 150 (see Figure 6 in Appendix A) (Ref. 1, Table 4-24; Ref. 17).

Chesapeake Bay

The total length of wetlands subject to potential contamination located downstream along the Chesapeake Bay within the TDL is 13.6 miles, therefore the wetlands assigned value is 350 (see Figure 6 in Appendix A) (Ref. 1, Table 4-24; Ref. 17).

Potential Contamination Factor Value

The potential contamination factor value (SP) is calculated as follows:

$$SP = \frac{(W + S)\ D}{10}$$

W = Value assigned for wetlands from HRS Table 4-24.
S = Value assigned for the sensitive environment from HRS Table 4-23.
D = Dilution weight assigned from HRS Table 4-13. Back River and Chesapeake Bay are coastal tidal waters (Ref. 17).

$$SP_{Back\ River} = \frac{(150 + 0)\ .0001}{10} = 0.0015$$

$$SP_{Chesapeake\ Bay} = \frac{(350 + 150)\ .0001}{10} = 0.005$$

$$SP_{Total} = 0.0015 + 0.005 = 0.0065$$

Potential Contamination Factor Value (SP) = 0.0065